Clear skies for computerized weather • Provident purchasing
Worry-free cost controls • Computer research outshines intuition

PERSONAL COMPUTING

FEBRUARY 1982
$2.00

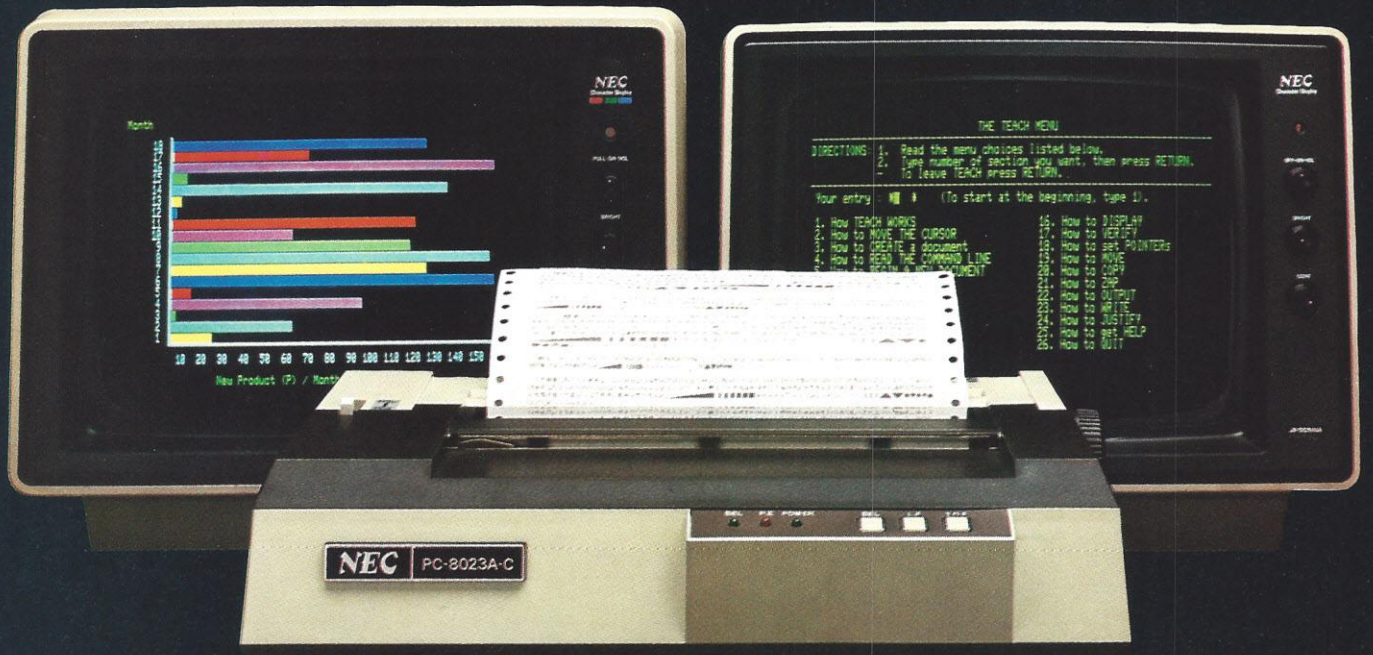
A Hayden Publication

02
70989 36666

Give your system some NEC, and watch its performance soar.

NEC's crisp, clear, high-performance JC1202 RGB color monitor, an industry standard. Also available: the JC1201 composite video version.

NEC's classic green monitor, (JB1201), one of microcomputing's performance legends. Easy on the eye, and the checkbook.

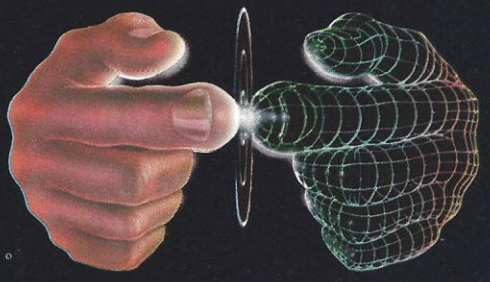


The impressive new NEC dot matrix printer. Parallel interface, 100 cps, 2K buffer, pin or friction feed. Stunning performance and versatility in the hottest new peripheral of the year.

You don't need an all-NEC system to benefit from NEC components.

Owners of Apple®, Radio Shack®, Atari®, IBM®, and many other microcomputers will find their equipment to be perfectly compatible with NEC's famous monitors, as well as our highly-featured new PC-8023A dot matrix printer.

Ask your dealer for a demonstration.



Productivity at your fingertips

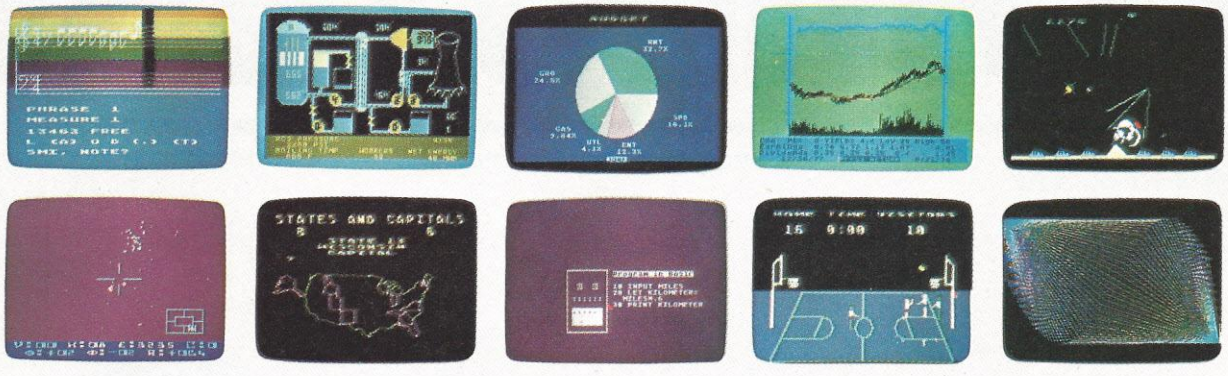
NEC

NEC Home Electronics USA
Personal Computer Division
1401 Estes Avenue
Elk Grove Village IL 60007

CIRCLE 1

THE GRAPHIC DIFFERENCE

BETWEEN ATARI® COMPUTERS AND ALL OTHERS.



3.7 million reasons why the ATARI Home Computer is something to see.
The display screen used with our computers is composed of 192 horizontal lines, each containing 320 dots. Delivering color and luminosity instructions to each dot for a second requires 3.7 million cycles...a lot of work for the normal 6502 processor.

That's why the ATARI computer has equipped its 6502 with its own electronic assistant. It's called ANTIC, and it handles all the display work, leaving the 6502 free to handle the rest. What this means to you is uncompromisingly spectacular display capabilities without loss of computer power needed to carry out the demands of your program.

That's a quality you just don't find in ordinary personal computers. And it's one of the reasons some computer experts say that ATARI computers are so far ahead of their time.

There's more...which is what you'd expect from ATARI.

Language. The ATARI Personal Computer uses several programming languages to give the user maximum control of its extraordinary capabilities. PILOT, Microsoft BASIC,* and ATARI BASIC are understood and spoken by the ATARI computer. You'll also find our Assembler Editor cartridge indispensable for machine language programming.

Sound. An ATARI computer has four sound generators, or voices, activated by a separate microchip. This leaves the principal microprocessor chips free to perform other tasks. And you can take full advantage of this capability which is designed for easy programming.

Change. ATARI Home Computers have been designed to make change and expansion easy. The ATARI computer has a modular operating system* that can be easily replaced as new technology develops. If you need it, memory expansion requires no more than inserting additional RAM modules.* And the ATARI ROM cartridge system also makes it easy to change languages. In short, your ATARI computer won't be obsoleted by future developments...*beause it already incorporates the future.*

Sharing. To learn more about the amazing capabilities of ATARI computers, visit your local computer store for a demonstration. Or send for our Technical User's Notes, intended for the serious programmer. They are only $27 and contain a lot more information about our computers' special capabilities than most companies could tell. See your ATARI dealer, or send $30 ($27 plus $3 postage and handling), payable to ATARI, to Technical User's Notes, c/o ATARI Customer Service, 1340 Bordeaux Avenue, Sunnyvale, CA 94086.

ATARI®

*ATARI 800™ computer only.

©1981 Atari, Inc.

A Warner Communications Company

CIRCLE 98

PERSONAL COMPUTING

February 1982
Vol. VI No. 2

DEPARTMENTS

5 EDITORIAL

7 FEEDBACK

10 OUTLOOK

76 EDUCATION

PRODUCTS

113 Hardware

Peripherals

Systems

Boards

Bits & Pieces

130 Software

Business

Educational

Utility

Communications

138 New Literature

158 PERSONAL COMPUTING DEALERS

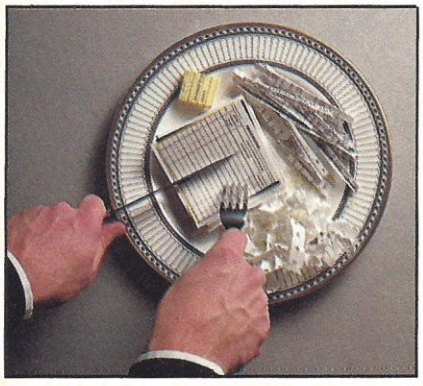
160 ADVERTISERS' INDEX

152,625 copies of this issue printed

Page 58

BEHIND THE COVER

There's no need to hire a warm body to ensure that your household runs smoothly. Personal computers are becoming the perfect servants. . .and they don't request TVs for their rooms.



Page 18

Page 34

Page 49

FEATURES

18 KEEP YOUR COSTS BITE-SIZE
BY JORDAN GOLD Personal computers are becoming financial watchdogs that are feeding their owners information that aids in keeping a tight lid on receivables, identifying bad inventory, helping turn good inventory faster and lowering payroll. The result: The gap between forecasted costs and actual costs is closing.

29 THE POWER OF PURCHASING BY COMPUTER
BY LEE THE' Buying the right item from the right person, in the right quantity, at the right time need no longer be a task that sends you scurrying for the bromides.

34 PERSUASION MADE EASY WITH POWERFUL PRESENTATIONS
BY KEN MCLAMB Computer-generated graphics are to presentations what dictionaries are to foreign-language students. They provide almost instant understanding of previously undecipherable data.

45 COMPUTERS INVESTIGATE THAT RESEARCH RAPIDLY, RELIABLY
BY JASON BIRMINGHAM AND BETSY GILBERT With more than 950 on-line data bases in the U.S. and Canada, there's no reason why you can't access information that is tailored to your needs, sans hours or days of research time.

49 A WINDOW ON THE WEATHER
BY ALAN RADDING Personal computers are being used to shed light on cloudy weather data and to help solve many weather-influenced problems—such as air pollution.

55 TECHNOLOGY SHOCK IS MANAGEABLE
BY SUSAN FOSTER When computing, frustration can set up blocks that can slow you down. This need not be the case, and the experts tell us why.

58 THE EFFICIENT NEW SERVANT COMES HOME
BY KEN MCLAMB Personal computers in the home are serving their masters by taking over dozens of manual functions that provide safety and comfort.

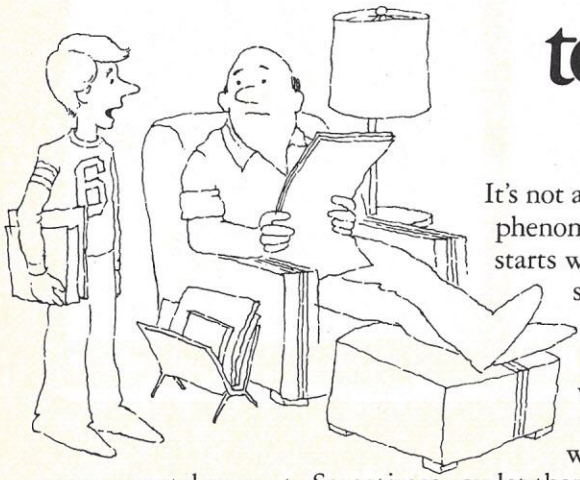
65 A PERSONAL COMPUTING SPECIAL REPORT: MASS STORAGE MADE SIMPLE
BY DAVID JAMES Memories are made of more than starry nights and moonlit ponds. In fact, memory, or mass storage in this case, is made more of a computer's capacity to transfer data from one source to another. Which of these sources is for you?

PERSONAL COMPUTING (ISSN 0192-5490) is published monthly by Hayden Publishing Company, Inc., 50 Essex St., Rochelle Park, NJ 07662. James S. Mulholland, Jr., President. Printed at World Color Press, Inc., Mt. Vernon, IL. Second class postage paid at Saddle Brook, NJ and at additional mailing offices.

Copyright© 1981, Hayden Publishing Company, Inc. All rights reserved.

POSTMASTER: Please send change of address to PERSONAL COMPUTING, P.O. Box 1408, Riverton, NJ 08077. Subscription rates: U.S. 1 year (12 issues) $18; 2 years (24 issues) $33; 3 years (36 issues) $46. Canada & Mexico: add $4/year for surface mail, $8/year for airmail. Other countries: add $8/year for surface mail, $36/year for airmail. Back issues: U.S.: $4. All other countries: $5.

"Dad, can I use the IBM computer tonight?"



It's not an unusual phenomenon. It starts when your son asks to borrow a tie. Or when your daughter wants to use your metal racquet. Sometimes you let them. Often you don't. But when they start asking to use your IBM Personal Computer, it's better to say yes.

Because learning about computers is a subject your kids can study and enjoy at home.

It's also a fact that the IBM Personal Computer can be as useful in your home as it is in your office. To help plan the family budget, for instance. Or to compute anything from interest paid to calories consumed. You can even tap directly into the Dow Jones data bank with your telephone and an inexpensive adapter.

But as surely as an IBM Personal Computer can help you, it can also help your children. Because just by playing games or drawing colorful graphics, your son or daughter will discover what makes a computer tick—and what it can do. They can take the same word processing program you use to create business reports to write and edit book reports (and learn how to type in the process). Your kids might even get so "computer smart," they'll start writing their own programs in BASIC or Pascal.

Ultimately, an IBM Personal Computer can be one of the best investments you make in your family's future. And one of the least expensive. Starting at less than $1,600† there's a system that, with the addition of one simple device, hooks up to your home TV and uses your audio cassette recorder.

To introduce your family to the IBM Personal Computer, visit any ComputerLand® store or Sears Business Systems Center. Or see it all at one of our IBM Product Centers. (The IBM Data Processing Division will serve business customers who want to purchase in quantity.)

And remember. When your kids ask to use your IBM Personal Computer, let them. But just make sure you can get it back. After all, your son's still wearing that tie.

IBM®

The IBM Personal Computer and me.

†This price applies to IBM Product Centers. Prices may vary at other stores.

For the IBM Personal Computer dealer nearest you, call (800) 447-4700. In Illinois, (800) 322-4400. In Alaska or Hawaii, (800) 447-0890.

CIRCLE 3

EDITORIAL

Give me liberty

That's what Patrick Henry said in the Virginia House of Burgesses. He was trying to persuade that body that Virginia should join with the other colonies in declaring itself independent of the mother country.

The Revolution was coming. He wanted to join in. He knew that his personal liberty was at stake, and he wanted to ensure future enjoyment of those unalienable rights — those that the French and English philosophers said were every man's birthright.

Of course, there were those who thought the coming revolution flew in the face of law and order — that it just wasn't right, and shouldn't happen. Those people were called Tories, and they lost everything as the tide of Revolution engulfed the land. Freedom for the individual won. The people triumphed.

I've said it before. There's a revolution going on right now. It's a revolution for personal computing. It's a revolution that again says the individual can take charge of his own destiny. It's allowing individuals to pursue their personal good using a small machine that amplifies their personal power enormously — the personal computer.

We've all heard it said that those who fail to learn from history are doomed to repeat it. It's true in personal computing as elsewhere, for we have people espousing Tory-like ideas today. I saw two articles just recently that make their ideas all too clear.

The first said the use of personal computers (although the author who wrote the article disdained to even call them that) should be closely controlled by the all-wise data-processing department. Otherwise, the (presumably) thieving employees would (mis)use them for (heaven forfend!) their own purposes. Clearly, the author thought, such misappropriation of company property is not to be tolerated.

The second writer, in a burst of charity the like of which has not been seen for many a day, said that manufacturers must really clean up their act in after-sale support. After all, the argument went, with so many systems soon to be sold to computer neophytes, who would protect those neophytes from themselves as they attempted to cope with the terribly sophisticated products that are being made available? Only the manufacturer has that wisdom, the story said.

Both those writers are editors of magazines read by people in the data-processing industry. I've got nothing against data-processing folks. I used to be a DP manager. I've got nothing against editors. I am one. I do object to being overly helped and overly protected. Give me liberty.

The problem is that ideas like those in the articles I mentioned are old-fashioned, as were the notions that the colonies should remain allied with England. The ideas are not in step with the times. Today's idea says individuals can use their own computers. They don't need intermediaries — some have called them "high priests" — to enjoy the benefits of computing. The companies that believe people can use their own computers have done things to make that happen. As a result, I've found after-sale support in the personal-computer field to be a phone call away. (Try getting help over the phone for an IBM 370!)

But the guys who wrote those articles don't know that support is so good because they never tried to get it, it seems.

They still cling to the idea that people need to be controlled and helped in their enjoyment of computing. It's the old, outmoded, Tory-like position. It's about to be swept away in the revolution that's coming — indeed is already happening.

So give me that liberty which Patrick Henry so ardently desired. Give me the chance to make a mistake. I won't get mad. I'll learn.

Give me the liberty to play a game on the computer. Even if it is at work. Even if it's not on my lunch hour. Is there anyone in the free world these days who thinks creative people (and people who use personal computing are creative just by definition) can go on for eight hours creating without a break? I'll be the better for the little relaxation the game afforded. And I'll do a better job, you can be sure.

Give me liberty. Don't make me submit to the old-fashioned ideas of those who would "help" me use computing. I'm smart enough to know when I need help.

Give me liberty. Don't stifle me with the fear of the computer as a company resource, not to be trifled with. Let me know it's my computer, that I can use for myself, whether I bought it or the company did. If I'm more productive with my computer (and I will be) then it's better for my company anyway.

Give me liberty. Let me make my own mistakes. I want to learn.

Give me liberty. My computer and I will do just fine, thank you.

David Ahl

A simple fact:

The considerable *benefits* of a personal computer like the Osborne 1® are often intangible, often exciting, and always expanding.

The *value* of the Osborne 1 is clear and simple:

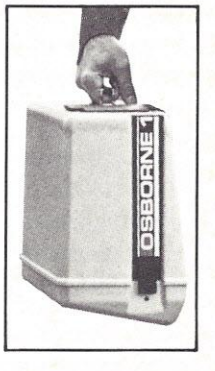
$1795. Complete.

$1795 includes this hardware:

Z80A™ CPU with 64K RAM ☐
Dual floppy disk drives with 100K bytes storage each ☐ 5" CRT ☐
Business keyboard with numeric keypad and cursor keys ☐
RS-232C Interface ☐
IEEE 488 Interface ☐
Weather-resistant, portable housing ☐ Operates on European and American voltages ☐

$1795 includes this software:

☐ CP/M® Operating System
☐ WORDSTAR® word processing with MAILMERGE
☐ SUPERCALC™ electronic spreadsheet
☐ CBASIC®
☐ MBASIC®



OSBORNE

Call (415) 887-8080 for the name of your nearest authorized OSBORNE 1 computer retailer.

CIRCLE 4

Trademarks: Z80A: Zilog Corporation
SUPERCALC: Sorcim Corporation
Registered Trademarks:
OSBORNE 1: Osborne Computer Corporation
CP/M: Digital Research MBASIC: Microsoft
CBASIC: Compiler Systems, Inc.
WORDSTAR, MAILMERGE: MicroPro International

PERSONAL COMPUTING

Editor
David Gabel

Managing Editor
Susan Foster

Assistant Editor
Elli Holman

Field Editor
Lee Thé

Copy Editor
Cecilia Wessner

Editorial Assistant
Dorie MacDonald

Art Director
Tom Gilman

Production Manager
Vince Cicenia

Production Assistant
Carol Tabak

Promotion Manager
Leslie Bouffard

Circulation Director
Barbara Freundlich

Subscription Manager
Robert Paratore

Reader Service
Paula Greenleaf

Manager of Dealer Service/Reprints
Maxine Sassano

Associate Publisher
Jeff Weiner

Publisher
Robert J. Lydon

For Subscriber Change of Address: Fill out coupon in this issue. Attach old mailing label, or write in your subscriber ID# which appears above your name. Fill in new address information and send to Personal Computing, P.O. Box 1408, Riverton, NJ 08077. Allow 6-8 weeks for address change to become effective.

Back Issues of Personal Computing are available on microfilm, microfiche, 16mm or 35mm roll film. They can be ordered from Serials Processing Dept., University Microfilms International, 300 North Zeeb Rd., Ann Arbor, MI 48106. For immediate information, call (313) 761-7400

Hayden Publishing Co., Inc., publishes Electronic Design ● Computer Decisions ● MicroWaves ● Personal Computing ● Electronic Design's Gold Book ● MicroWaves' Product Data Directory ● Hayden Books ● Hayden Software

Audited Paid Circulation ABC

FEEDBACK

LOGO lovers

Dear Editor:

As a TI LOGO owner and user, I was interested in the article by Steven Berry ("Progressive learning by computer," December 1981). The article gave a good introduction to the spirit of learning with TI LOGO and to some of its capabilities.

I was especially glad to see the sentence, "As simple as these exercises are, the language also enables students to explore a succession of increasingly complex capabilities." This is true. The language allows the manipulation of arbitrary list structures, and opens up the world of recursion. Nearly any feature one would want the language to have can be added by defining procedures.

I was a little confused, however, that the accompanying illustration was of an Apple instead of a TI 99/4. That illustration was misleading.

Roger B. Kirchner
Professor of Mathematics
Carleton College

Editor's note: We are guilty as charged.

Special question

Dear Editor:

For four hours a day I swim in mathematics, evaluating the stock market for my own accounts. I analyze 270 stocks per week and 30 stocks per day, as well as the usual broad stock-market indices. Each stock (daily or weekly) requires 18 stock-factor entries. Market indices and stocks are also graphed daily. All data are up-to-date. Besides paper and pencil, my equipment includes the daily newspaper and one calculator, a Unisonic L.C. 500.

In the four issues I've received of *Personal Computing*, there is no mention of any product or service which could smooth my task or reduce my workload. I'm relying on you and/or your staff to search the "field" and mention a product or service that I should consider, if any exists as yet.

Congratulations to you on a truely handsome publication.

James D. Franks
Hingham, MA

Editor's note: By now you should have seen our January 1982 issue containing an article entitled, "Intelligent investment management by computer." This article should answer some of your questions and get you well on your way to solving your problem.

Taxing points

Dear Editor:

After reading your December 1981 issue, I feel obligated to enlighten Robert Perry, author of "Tax-preparation software: how to ease the IRS blues," on two points.

The first concerns the Employee Business Expense form which is used several times to illustrate the article. Deducting the entire cost of the personal computer, monitor, disk drives and printer in the year of acquisition will certainly not "ease the IRS blues"—your taxpayer would be well advised to find an accountant who will depreciate these assets rather than expensing the entire amount.

The second point concerns the unjustified propagation of the sleeve-garter, green-eyeshade stereotyped accountant. Perhaps the author should meet some of the dynamic, progressive individuals who are proud to be part of the accounting profession today. He should not rely on the Charles Dickens' account of an English bookkeeper.

If the members of my profession

are conservative when it comes to computer acceptance, it is with good cause. We have been involved in cleaning up too many disastrous, ill-planned computer conversions.

Ronald C. Knecht, CPA
Portland, OR

Editor's note: We hope our article helps reduce the number of disastrous computer conversions.

Payroll thanks

Dear Editor:

We were delighted to read your article on payroll packages which appeared in the July 1981 issue of *Personal Computing*. Articles such as yours are sorely needed to help businessmen make intelligent choices when selecting software. Because of that need, such articles must be accurately researched to preclude the chance of misleading prospective customers. You have done an admirable job all the way.

In future marketing efforts, we will often reference your article. We are sure that many businessmen who read it carefully will agree that the time spent in your research will be of great benefit.

Once again, our thanks, not only from CPI, but from the total business community.

Daniel A. Ellis, President
Computer Products International
Matairie, LA

Kitchen update

Dear Editor:

I am writing regarding the Buyer's Guide printed in the November 1981 issue of *Personal Computing*, on page 102 ("Computers in the kitchen"). Unfortunately, the listing is incorrect.

Some time ago, Patient Care Data Systems did sell a dietary program called FOOD for $29.95. Since then, the company became PCD Systems, Inc., and FOOD was revised, improved and updated. It is now called NUTRI-CALC. NUTRI-CALC is a much more sophisticated program, and sells for $350. FOOD is no longer available.

Jody L. Scherrer
Director of Marketing
PCD Systems, Inc.
Penn Yan, NY

Help requested

Dear Editor:

Approximately five months ago I subscribed to your magazine, hoping I could learn of more ways to apply my computer. I also wanted to find more software available for it.

I own an IBM 5110 system, with dual disk drives, a 120 cps printer and 32k memory. It operates in BASIC with programs and procedure files as standard equipment. The procedure files can be used to do a sort in six different fields at one time. I have run a sort on this system for over 2000 vendors in six fields in a little over two minutes.

If you know of anyone who works with communications for the 5110 system, I would appreciate if they could contact me and supply me with information about that application. I am also looking for other software sources.

Paul S. Reese
243 New Elizabeth St.
Wilkes-Barre, PA 18702

Kitchen delights

Dear Editor:

I read your article "Computers in the kitchen" in the November issue of *Personal Computing*. I'm glad to see that someone is putting the computer to work on home chores. I have been using a "Main Course Planner" program to help with the problem of what to have for dinner for over two years. Unfortunately, you were apparently not aware of this program.

The "Main Course Planner" program generates a list of suggested main course tailored to the user's tastes. It has a unique feature that is different from the programs you mention in your article in that it is self-modifying and continuously adapts the list to the user's actual eating history.

I find that my family enjoys their meals much more since I've been using this program, due to the increased meal variety. I also find meal planning more enjoyable.

The "Main Course Planner" program is on tape for the TRS-80 Model I, Level II, 16k computer. It is available from SCDC, 223 Cedar Heights Dr., Thousand Oaks, CA 91360 for $9.95.

Gwen Olshove
Thousand Oaks, CA

Shopping dilemma

Dear Editor:

I just read the January issue and I thank you for your article, "Selecting your computer and your computer dealer."

I recently bought my first system and there is no way that I can accurately communicate to you the nightmares and cold sweats I experienced before I decided what to buy.

But it didn't have to be that way. If I had known what I needed and what I wanted to spend before shopping, it would have made my task that much easier.

Keep those articles coming for those who have yet to enter the world of actual shopping.

Jerome Faust
Ypsilanti, MI

"We provide business programs as individual as your business needs."

"Allow me to introduce myself. I'm a Vector computer, dedicated to the advancement of society. And I'd like to tell you how a computer can help you manage your business more efficiently. Especially if that computer is a Vector, like me. Because we're probably the most flexible and cost-effective computers you can find.

"Our programs are the key. Because they enable me to handle sales forecasting, budgeting, job costing and proposals, commissions, personalized mass mailings, charts and graphs. We Vectors can even talk to each other and to other bigger computers.

"Unique combinations of our individual programs can actually customize me to meet your specific requirements. Any combination of our software packages can be assembled right off the shelf, to help you realize your full potential as a salesman, merchant, stockbroker, clergyman, contractor, real estate or insurance agent or whatever your business.

"Choose from Memorite III for word processing and mail list management, Execuplan for financial planning and forecasting, Business Accounting, Data Management for filing and sorting information, Communications and a host of others. And, of course, all we Vectors come with the popular CP/M operating system.

"For more information and your local dealer, call us at (805) 499-5831 or (800) 235-3547. In California, call (800) 322-3577. Or write to us at 500 North Ventu Park Road, Thousand Oaks, CA 91320.

"We'll show you how we small information systems can mean big business for you."

VECTOR

Vector Graphic, Inc.

COMPUTERS FOR THE ADVANCEMENT OF SOCIETY.

Sold and supported by 400 dealers worldwide.
Vector Products are approved on General Services Administration authorized ADP scheduled price list.

CIRCLE 43

OUTLOOK

New personal-computer TV series

A joint venture to provide programming for consumers on the use of personal computers has been announced by executives of American Educational Television Network (AETN), in Irvine, Calif., and Miller Technology & Communications, based in Phoenix, Ariz.

The new 13-week programming series will air on the American Educational Television Network over a period of one year.

The series is being designed for the the professional and small businessman. Each 30-minute program segment will contain 24 minutes of educational content and six minutes of advertising—one of which will be offered to local broadcast stations for sale in their markets.

AETN will broadcast the series on Saturday mornings to its network of cable and UHF broadcast stations. The first broadcast is scheduled for late March 1982.

Camp for adults

Computer Camp, which calls itself the pioneer of summer camps that educate children about personal computers, is branching out. The organization plans a computer camp for adults, whose first session will take place on the sixth of this month at the Club Mediterranee in Ixtapa, Mexico.

To participate in the event, one need only pony up $600, along with the normal Club Med fee. For that fee the participants will receive 36 hours of hands-on instruction, roundtrip jet transportation, accommodations for seven nights and three meals a day.

Denison Bollay, president of the Computer Camp, says the choice of the Mexican location was a good one. "The learning environment is very important," he says. "The atmosphere we have captured at Ixtapa will generate enthusiasm among our guests."

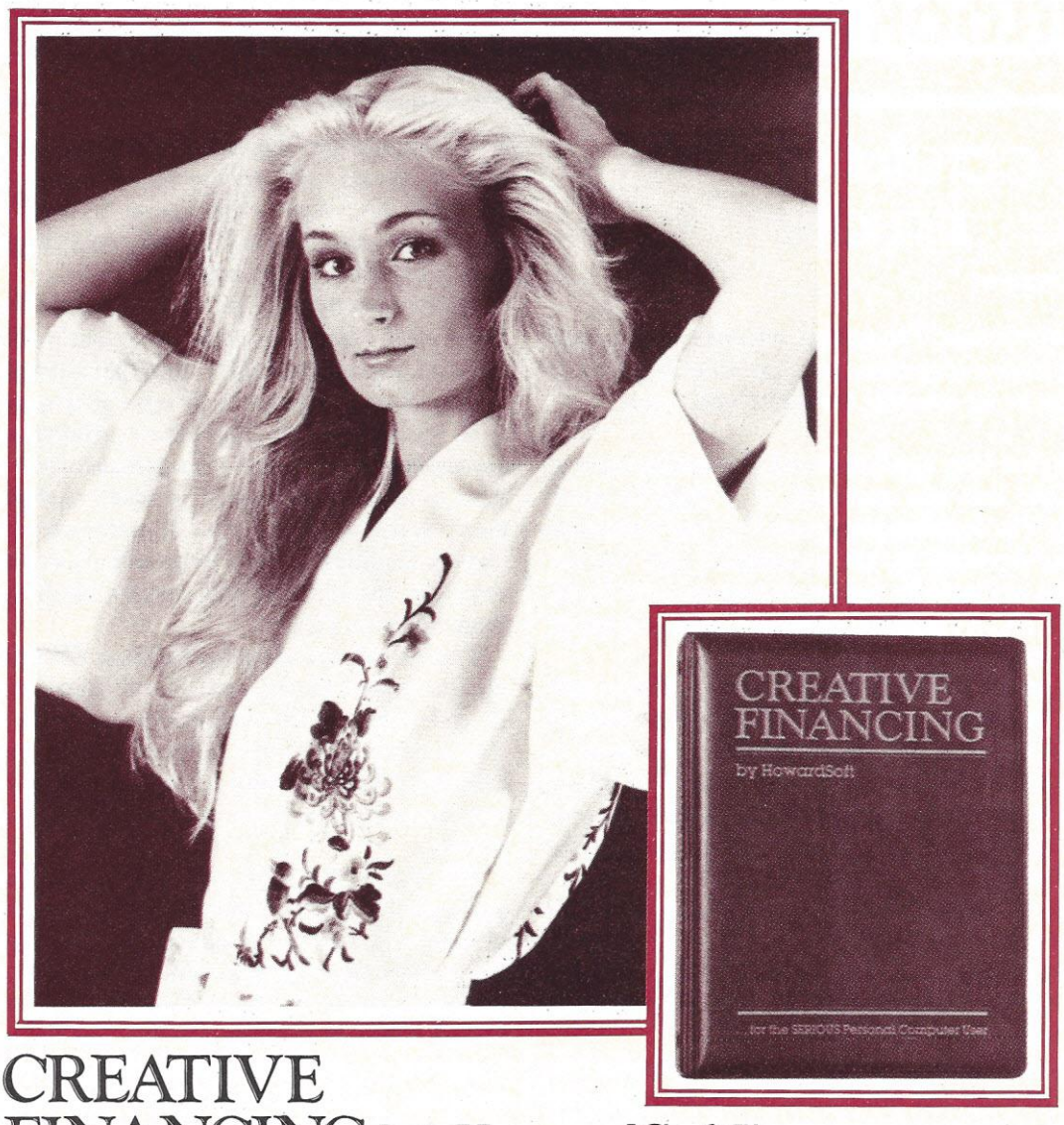
Sessions will be scheduled weekly. Reservations should be made through Computer Camp, Inc., at (805) 969-7871.

How about swapping those computers?

A high-technology flea market, Computer Swap America, has been organized to provide consumers with an opportunity to buy new and used computers, software, diskettes, disk drives, printers, books and other computer-related equipment.

The show will make its debut in Southern California on February 6 at the Orange County Fairgrounds in Costa Mesa. It will then travel to the Santa Clara Fairgrounds in San Jose. Further information can be obtained from Computer Swap America, PO Box 52, Palo Alto, CA 94302.

WORTH WAITING FOR . . .



CREATIVE FINANCING by HowardSoft™

It's been a long time coming, but it's finally here—the powerful new financial tool from Howard Software—and it's totally UP-TO-DATE. It includes the latest in creative loan types and even reflects the tax consequences of the Economic Recovery Act of 1981, complete with the new ACRS depreciation tables for all future years. Whether you invest in bonds, stocks, real estate, or trust deeds, or you just want to evaluate annuities, mortgages, or consumer loans, you can trust this package to give you the real answers under the latest tax laws and changing economic conditions. Even more sophisticated than our respected Real Estate Analyzer, you can finally have professional analyses that give the answers to "what if" questions without requiring you to be a financial whiz.

PRACTICAL—generates professional reports complete with title page, printing only the table you request; includes present and future values, loan APR and IRR, monthly loan schedules, full tax impacts, equivalent annuities, annual depreciation schedule, and the useful performance measures ROI, IRR, and FMRR; great for objectively comparing dissimilar loans and investments.

FRIENDLY—not just an operating manual but a textbook on investment analysis; friendly recovery from user errors; menu driven and interactively self-prompting.

FLEXIBLE—numerous separate schedules with monthly or yearly inflating or staircase increases; tax rates, money rates, loans, depreciation, income and expense items all handled flexibly; numerous automatic features but manual entry as well.

AUTOMATIC—loan types include amortized, interest only, graduated payment, renegotiable rate, variable rate, reverse annuity, balloons, deferred payments, and more; depreciation types include straight line, sum of years' digits, declining balance (any percentage, with or without auto conversion to straight line), and ACRS.

NOW AT YOUR DEALER NEXT TO our **TAX PREPARER & REAL ESTATE ANALYZER** software. (Apple and CP/M versions available).

Howard Software Services
. . . for the SERIOUS Personal Computer User

8008 Girard Ave., Suite 310 | La Jolla, CA 92037 | (714) 454-5079

CIRCLE 6

Be careful of the ultimate

Ed Warshawer

Editor's note: The author, who has been around computers a long time, gives us some thoughts to ponder as we consider the latest whiz-bang.

Not too long ago I attended a demonstration of VisiCalc that was presented to a TRS-80 users' group. The demonstration went fine, and I must say I was impressed by the capabilities that are becoming available for personal computers, the Radio Shack TRS-80 personal computer being only one of those machines.

After the VisiCalc demonstration, another software demonstration was held. This one was aimed at the software enthusiasts. It was a milestone in software for personal computers. One could indeed think it was the "ultimate disk operating system for the TRS-80," as the person sitting next to me breathed.

The excitement was felt throughout the audience as the speaker, a member of the users' group, continued to show one amazing feature after another. The software was really great, and it worked the first time, too.

There were new directory commands, device routing, spooling, and other goodies that brought some people to the edge of their seats. And me? I was also tremendously impressed, but not at the new innovations being presented. Instead I was surprised that all these older features were now being introduced to the TRS-80. Older features? What I mean is these are features that have been around for a while on some of the mainframes and minis, but, of course, on the TRS-80 they are new.

These features caused me to reminisce. I remember very clearly some of these exact features being announced in the early 1960s, after I had spent a number of years on those real biggies (the one's with the vacuum tubes).

I continued thinking back to when I worked on my first disk operating system (on the Burroughs B5500 computer). The software had features similar to those being discussed, like device independence, routing to other files or devices (then called label equation), and spooling (then called printer backup).

As I was visualizing my old Burroughs days, I heard the speaker mention the word "SYSGEN." This feature allows the user to configure his system, load his drivers, set various options and customize them for his system. But again, SYSGEN is a brand-new term for the TRS-80, even though it's been around for a long time.

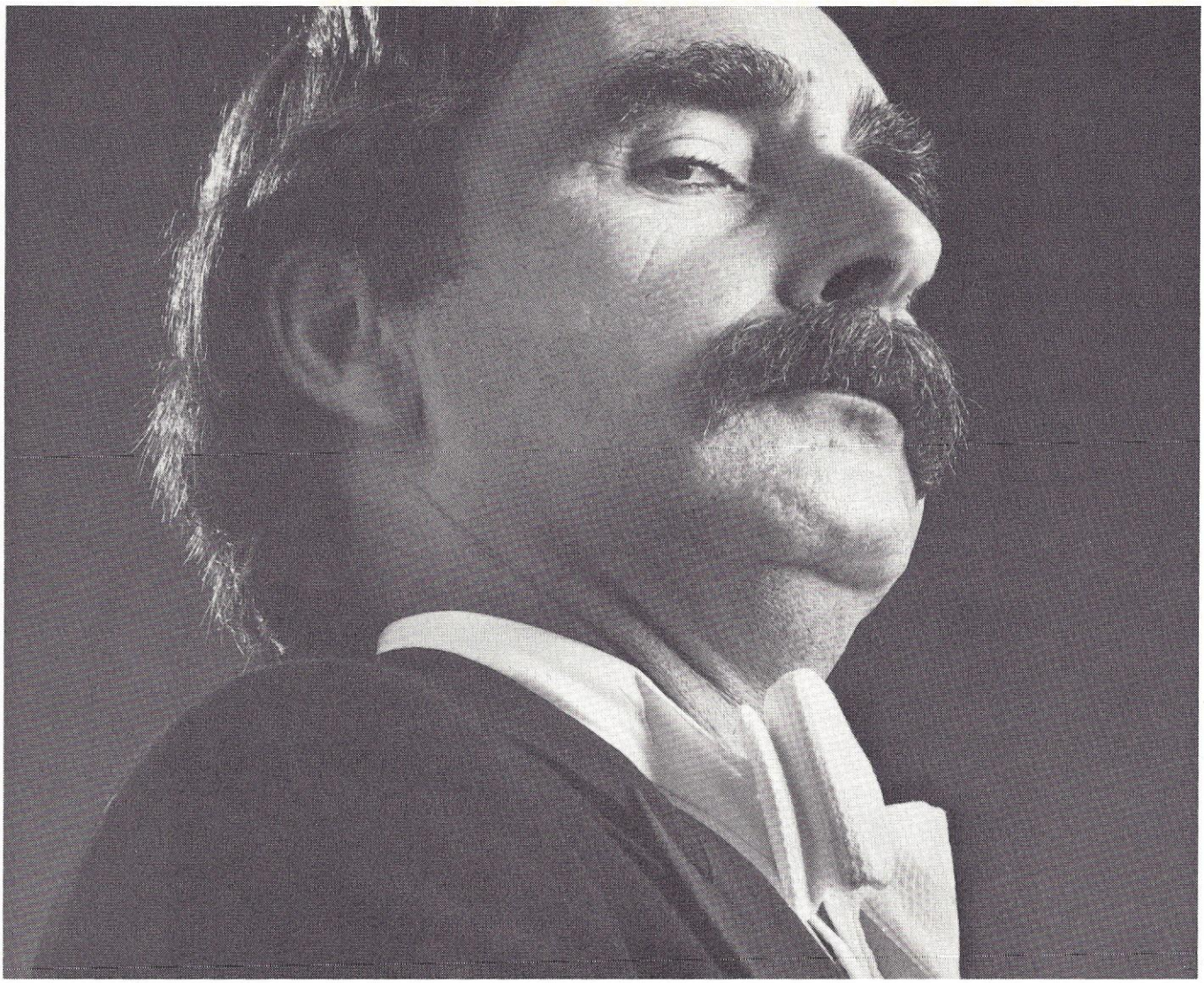
I must date myself again and go back to the early 1960s when I first heard that marvelous word SYSGEN. It was a wonderful feature that allowed users to customize and design their systems to meet their data-processing and hardware-configuration requirements. Customizable features included: region sizes to meet applications, resident modules, options, access methods, special hardware devices, logging facilities, generic terms and on and on. All computer installations with similar hardware had these fantastic choices.

The system specialists were all busy SYSGENing the best system for their use. The different computer sites tailored their systems so effectively that it would take weeks for someone from another "identical" site to be able to run a simple payroll or cost accounting system on a differently tailored system.

The moral of all this is beware of the complex packages. If you are running programs and are pleased with their performance, and if you feel that you are getting what you want from your personal computer, don't dive head first into every revolutionary software package you see. Just because an operating system keeps accurate time and changes dates after midnight, don't buy it if you are in bed every night at 10:00 p.m. with your computer powered off. And don't buy software that you can route to various different devices when you don't have a printer or RS-232 interface. Remember, the more bells and whistles you have in your software, the more disk space they will occupy. More memory may be required. More complexities in the software lead to more possibilities of subtle problems. When that happens, changes to software become a continuing maintenance procedure.

No really complex software will be immune to the continuous changes that are usually required, even on a personal-computer system. These changes will again divide users, so that those having the same software and hardware may still be running on different software revisions, since some will be faster to install fixes than others. This, of course, can lead to incompatibility between identical systems.

The good old Radio Shack TRDOS-2.3 is still an excellent investment for only $14.95. It may very well be the ultimate operating system for your TRS-80 computer.



A Case For Discrimination.

Discriminating computer users don't want the *best known* word processing software. They want the *best* word processing software.

Hewlett Packard, for instance, spent 9 months comparing 7 microcomputer word processing software systems—including the most popular brands—for distribution with the new HP125 microcomputer.

Hewlett Packard's conclusion: Spellbinder is superior to every other system evaluated.

The reason? Spellbinder's unrivalled ease-of-use and superior capabilities. Spellbinder requires fewer keystrokes for entering and editing text, and provides more flexible printing options without changing the way you enter text. Spellbinder and an inexpensive microcomputer easily rival dedicated word processing systems costing up to *three times* more.

In addition, Spellbinder offers features for mass mailing and for professional legal texts. The price also includes forms handling and "boiler plate" features to store and merge commonly used documents, forms, and paragraphs.

Best of all, Spellbinder's lofty capabilities are available at a very competitive price. In fact, some of the bigger names in word processing packages demand a much higher price, for a package with far fewer features.

Hewlett Packard wouldn't settle for less than Spellbinder. You should be just as discriminating. See your nearest computer dealer for a demonstration of Spellbinder. Or call Lexisoft at (916) 758-3630.

Spellbinder™

Spellbinder Word Processing and Office Management System.

A product of Lexisoft, Inc.
Box 267, Davis, CA 95616 □ (916) 758-3630

CIRCLE 7

Stop Playing Games And Get Down To Business

Corvus Transforms the Personal Computer into a Powerful Business Tool.

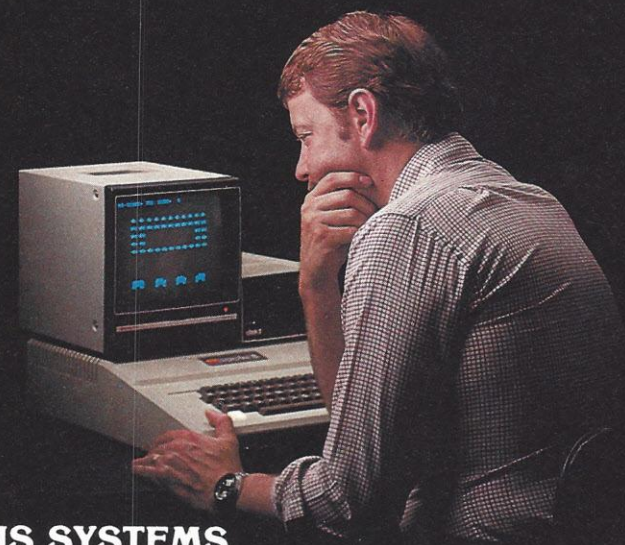
In business, professional offices, and schools throughout the world, thousands of Corvus intelligent peripherals bring mass storage, increased speed, and multi-user capability to a variety of microcomputers. Current applications include accounts receivable and payable, medical records, mailing lists, inventories, word processing, insurance, mathematics and science, and other large and complex files.

Corvus proven Winchester disk technology provides 5 to 80 million bytes of capacity, fully compatible with your current operating system. This is up to 500 times the capacity of a floppy disk.

The Corvus Omninet links up to 64 computers in a state-of-the-art multi-processor network. It provides shared mass storage, pipes for inter-computer communication, and system spooling for sharing of peripherals such as printers. Performance far exceeds that of larger and more expensive networks.

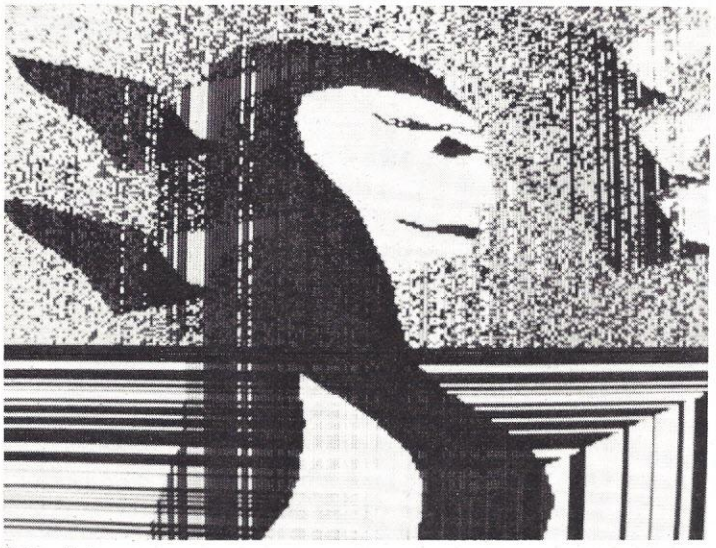
Backup data protection and archival storage are provided by the Corvus Mirror (Patent Pending), a low-cost backup using standard video cassette recorders.

Contact your local Corvus dealer for the full story about these innovative new products.

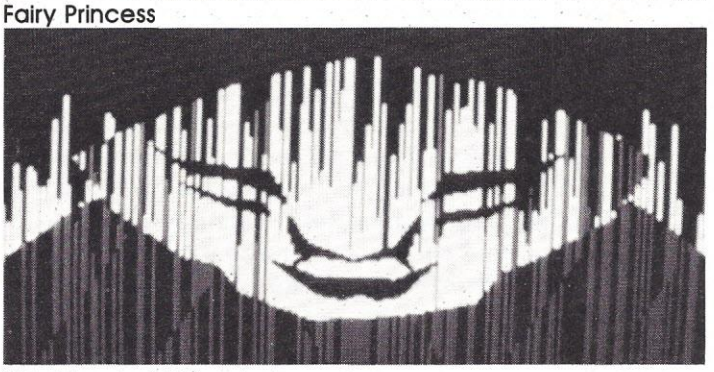


CORVUS SYSTEMS
2029 O'Toole Avenue
San Jose, California 95131
(408) 946-7700/TWX 910-338-0226

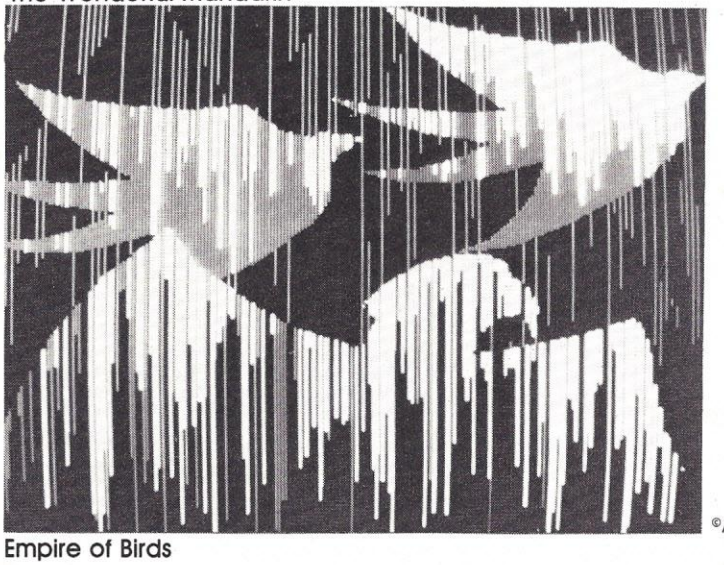
CIRCLE 8



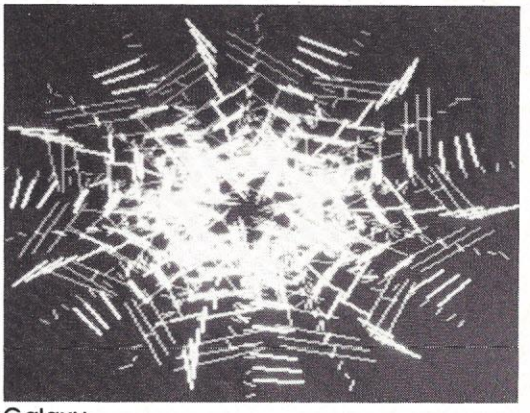
Fairy Princess



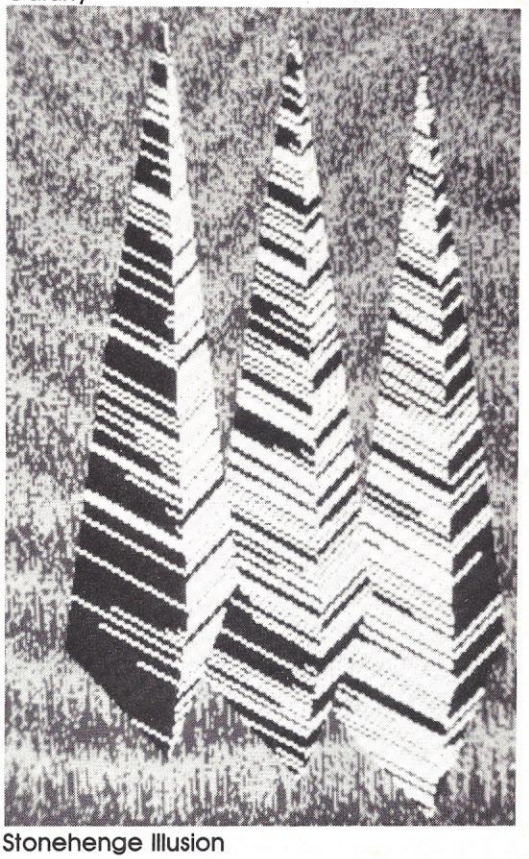
The Wonderful Mandarin



Empire of Birds



Galaxy



Stonehenge Illusion

©All Photos reproduced courtesy Peter Stampfli

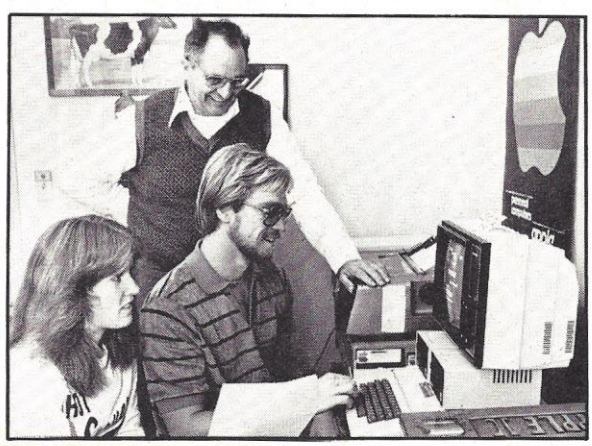
The photographs above were submitted to *Personal Computing* by Peter Stampfli of Sweden. He states that "Computer systems with graphic displays come close to being a new kind of magic brush, a brush that can not only draw points and lines, but whole patterns—portraits of people, objects or landscapes—on command. You can also try different versions of the same picture until you find the one that appeals to you the most. You will discover a new universe where only your fantasy and imagination reign."

From Bessie to "number 365"

For years dairy farmers have been shipping herd data to several mainframe computers across the country. They get the processed information back about three weeks later. Now some dairy managers—like Dr. Manuel Borges, of Chico State University in California—are using personal computers to supplement the batch processing with more timely data.

The batch-processed information is used to determine optimal breeding and milking patterns; which cows get bred, when, and to which bulls; and which cows are producing enough milk measured against feed, seasonal and herd factors. All this data can then be crunched into a dollar value for each cow and bull at any given time.

The advantage of personal computers is speed of response. As Borges says, "As soon as I pull this list off the Apple, there are four cows that are going to be put on the truck. We can make decisions right away based on the information from the computer.



Students at Chico State University in California learn to solve "dairy problems" using an Apple II.

"The Apple does the records here. In the morning I boot up the herd disk and it reports on the cows that have to be bred out today, this week and this month. We primarily use two pieces of commercial software: VisiCalc for my work and PFS (Personal Filing System) for the data base.

"VisiCalc does the mathematics. It allows me to change the cow's body weight, and gives an immediate readout all the way down.

"We are using PFS as a data base, and I use it to do all the records. My wife even does her checkbook on it. I have a colleague who looks down his nose at my Apple. He uses a big machine. The other day he came by practically on his hands and knees to ask me if he could use the Apple. He then told me that his machine had been down for a week!"

The bottom line is that for the price of an Apple system Borges can get information in an hour that used to take three weeks. Borges also knows of dairy farmers with less than half the size of Chico State's 186-cow herd using small computers profitably.

Borges' students have to learn some computer science and be able to do some programming to make it in dairy-farm management, he feels. "If they can't, they won't make it. The students have cows. To calculate their milk check they have to do a lot of arithmetic. So we put those figures on the computer. Now they each buy a disk and write a BASIC program that does their calculations directly.

"My friends keep saying that you can't do anything with the Apple, you have to have more core memory. They are wrong. I can do 99 percent of the work on the Apple." As for the other one percent (mainly complex statistical calculations), Borges is getting a modem for the Apple to use it as a time-sharing terminal when needed.

They don't call the cows Bessie, or Elsie, anymore. "Number 636" is more like it. But dairy farmers have learned what all businessmen who survive have learned: There's precious little romance in what you do if you can't write the bottom line in black ink. Personal computers are helping them reach that goal, and stay there.

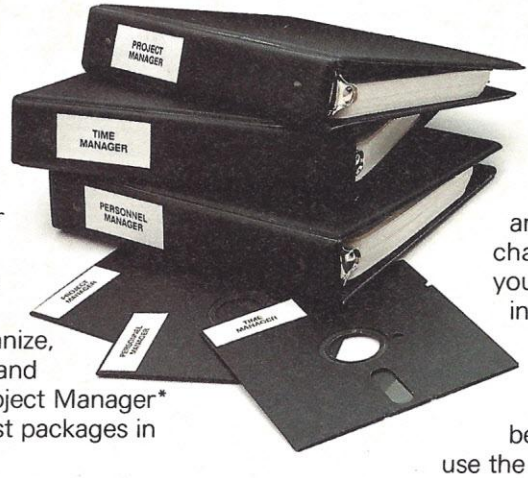
Software protection: the law

Choosing among copyright, trade-secret and patent protection for software is difficult, at best, according to speakers at a recent conference on software protection. The conference featured speakers from the three sponsoring organizations—the Computer Law Association, the U.S. Copyright Office and the U.S. Patent and Trademark Office—as well as attorneys who specialize in patent, copyright and trade-secret law.

According to the speakers, copyright is the easiest protection to obtain. You receive it merely by "creating an original work" and recording it "in a

continued on page 97

The Manager Series* from Microsoft™ turns a personal computer into an executive toolbox.



Better management tools. The Manager Series from Microsoft turns an inexpensive personal computer into an executive's toolbox. Not a computer programmer's toolbox. An executive toolbox. Computerized management tools for non-computer people.

Time, people, projects. The Series is a system of software tools that work together to help you plan, organize, schedule and record your business and personal affairs. Time Manager,* Project Manager* and Personnel Manager* are the first packages in the Series.

Write it once. All programs in the Manager Series allow you to transfer information between programs. That means you can enter information in one program and transfer it for management by another.

Time Manager. The key. Time Manager helps you manage your personal time, appointments and priorities. It can also help you manage expenses, costs and job schedules. Or, keep a running tally of costs and hours by day, week, month or year. And Time Manager can act as an "executive" to manage other programs in the Series.

Project Manager. Describe the components of a project to Project Manager. It will create timing, task and resource charts to help you focus on critical tasks. Change one piece of information and Project Manager will recalculate the entire project. Project Manager even flags overcommitted personnel resources.

Personnel Manager. Manage information about people, companies, customers or prospects. From names and addresses to skills, position, and characteristics. Personnel Manager lets you enter any kind of people-related information. Then, organize and retrieve it almost any way you want.

Management software. Even if you've never used a computer before, you should be able to productively use the Manager Series in a very short time. And, when you've learned to use one in the Series, you've virtually learned them all.

Seeing is believing. Ask your local computer store for a demonstration of the Manager Series. It's a series of management tools that could be your best reason to own a personal computer.

*Trademarks of The Image Producers, Inc.

MICROSOFT
CONSUMER PRODUCTS

A Division of Microsoft, Inc.
10700 Northup Way • Bellevue, WA 98004

CIRCLE 9

Keep your costs bite size

You can stop reaching for financial bromides and start identifying your cost villains by using your personal computer

PHOTO BY STEVE SAGALA

Jordon Gold

It's kind of like a control panel in the cockpit of an airplane. When you're two degrees off, it lets you know. Then it's up to you to figure out what to do about it."

The speaker is John Nye, executive vice president of Ammon Financial Corporation, a management-assistance firm based in Dallas, Texas. He compares the way personal computers help to control costs to a navigational device. "But the manager is the pilot," he states. "A computer is a tool. Given the correct data, it can give you all the information you need to make sound financial decisions, but it can't make those decisions for you."

Phil Russell, computer consultant for Richard O. McCall, Inc., a financial-planning firm based in the southwest, agrees. "A computer gives you better information. If a person is a good manager he can take that information and make money with it."

The main type of information that these men are talking about is cost control. In your business, you are faced with many different types of costs. Given the correct information it can help you to keep a tight lid on your receivables, to turn over your inventory faster, to identify bad inventory so you can turn it into cash, to lower your payroll and associated costs and to increase your cash flow. The main way the computer does this is by comparing forecasted versus actual costs, and by allowing you to manipulate the forecasts to see what effect changes would have on the results. It also provides a convenient space for data storage and can keep your costs organized.

decisions that affect the overall status of your firm on a daily basis. Many of these are associated with cost control.

A computer can help you to control

Above all, a computer can help you

to do these things much faster than you could without one. The information is at your disposal at the touch of a button. But, in order to use a computer to do this, you need the proper software.

Speed and versatility

Many different types of software are available to help you to control your costs. Probably the most important is VisiCalc.

VisiCalc is published by Personal Software of Sunnyvale, Calif., and is available for most computers in one form or another for approximately $200. It can help you to prepare all sorts of financial reports and then to alter those reports by changing one or more variables, while still keeping an accurate bottom line. People who use VisiCalc like it.

John Nye likes VisiCalc's speed. "It used to take four days to get a financial report in handwritten form. With VisiCalc, I can get it from start to finish in 30 minutes."

Phil Russell especially likes VisiCalc's versatility. "If you can think of a formula for something, you can use it on VisiCalc," he says. Russell also says that VisiCalc is the wave of the future in business. "By 1990, everyone in business will have to know VisiCalc or a program like it to survive."

Although VisiCalc is very popular, it isn't the only software on the block. A & A Trophy Company, one of the major suppliers of trophies to small trophy houses in the U.S., uses software manufactured by International Microsystems (IMS), a Kansas City software house.

"We have a complete package of software for all of our business functions," says owner Bill Hess. The software includes packages for mailing-list management, payroll, general ledger, fixed asset with depreciation schedules, accounting, open-item accounts receivable, manufacturing inventory control, wholesale/retail distribution, building materials and accounts payable. It all adds up to efficiency, and at a low price.

"I priced a similar software package for $75,000," Hess says. "This package sells for $8000."

A & A has become a regional distributor for IMS software. "We modified the IMS software for our own use," says Hess' son Tyson Hess. "IMS has taken some of our suggestions and incorporated them into the software that it markets."

> **"The main ingredients for analyzing a business are accurate figures for cash, accounts receivable, accounts payable, payroll and inventory."**

One good reason why manufacturers should take advice on modifying software is that many people who design the software never use it. "It shouldn't be that difficult to design a software package that is flexible enough for everyone and that meets AICPA (American Institute of Certified Public Accountants) standards," Nye says. "But most of the people who design the software have very little knowledge of how it's used."

One solution to this is to design your own software. Many people have done this with very little programming experience. "I turned out my first program in two months," Nye says. He doesn't recommend this as the way to go, however. "It takes too long to get a program to work properly. You should try to find a canned program that best meets your needs."

Nye recommends software by R & E Business Systems. "The software was designed by a CPA and a programmer. It has very few problems."

The software you buy is up to you. Be advised, however, that there will probably be things you won't like about any software you choose. People even have complaints, minor though they are, about VisiCalc. Nye wishes it were available on CP/M, and Chris Aves, president of Petcom Systems, a personal computer designing and programming service for the oil and gas industry, wishes that it could sort a column of numbers. Still, Nye admits that every time he uses VisiCalc he finds something new about it. If you're planning to use a computer to control costs, VisiCalc could be a valuable part of your software library.

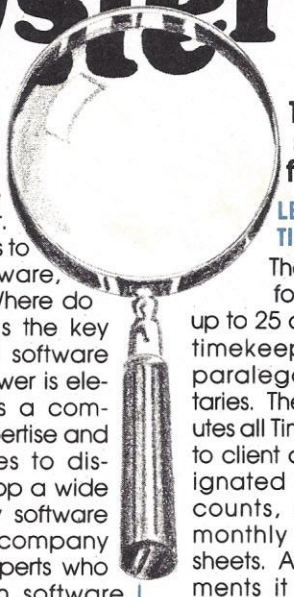
Once you have the software you need, you will then need correct information before beginning to control costs. "The main ingredients for effectively analyzing a business are accurate figures for cash, accounts receivable, accounts payable, payroll and inventory. You can't help anyone control his costs if you don't have this information," says Nye, whose firm deals mainly with clients in distress situations. "We feel so strongly about this that we insist that our clients let us keep the records for their accounts receivable, accounts payable and payroll and that they supply us with accurate inventories and cash statements."

Find the villain

If you are in any business other than banking, you probably don't appreciate customers who use your money for their own purposes. A computer can help you to identify the villains by aging your accounts receivable.

"There are two other major suppli-

Solve the Great Software Mystery!



You spent a lot of time searching and researching to find just the right computer. But when it comes to compatible software, you're stymied. Where do you turn? What is the key that unlocks the software mystery? The answer is elementary. It takes a company with the expertise and research facilities to discover and develop a wide variety of quality software programs — a company with a staff of experts who understand both software and hardware — a company that is not only reliable but offers unique 24-hour services and — a company dedicated to being your software company.

With all these pluses there's no mystery as to why Westico is so popular with knowledgeable software buyers. But look! There's more.

The Westico 24-Hour Computer Hotline (203) 853-0816

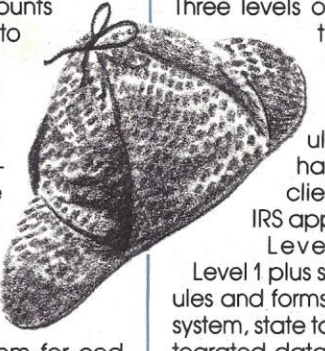
(300 baud) for detailed program information and quick access ordering.

- A full range of professional software.
- Support for a wide variety of CP/M® and other computer systems, including: TRS-80 Model II, Apple, Vector Graphic, Cromemco, North Star, Micropolis, Ohio Scientific, Altos, Dynabyte, IBM, SuperBrain, Xerox, Zenith and more.

Two new solutions from Westico

LEGAL BILLING & TIMEKEEPING

The LBS is designed for law offices with up to 25 attorneys and 35 timekeepers, including paralegals and secretaries. The system distributes all Time and Expenses to client accounts or designated Overhead Accounts, and produces monthly Client Review sheets. After any adjustments it also provides: ready-to-mail itemized bills, monthly Office Management Summary, Aged Receivables Report. An Accounts List is also built into the system.



Complex transactions recording is reduced to a minimum because the LBS system is based on daily timesheets prepared by each timekeeper with a complete system for coding client matters and expenses. The attorney auditing the pre-billing review form can choose various predetermined rates, or bill on retainer, contingency fee or an adjusted basis.

The Office Management Summary provides a financial analysis of each attorney's billings, aging of his accounts receivable and an analysis of the work effort of each timekeeper and total for the firm. The Accounts List summarizes current activity and status of each client.

The LBS is designed so that even first-time computer operators can install the system without expert help.

System/documentation-$895
Demonstration System-$ 75
Documentation alone-$ 40

MICRO-TAX

Micro-Tax provides in-house computerized tax capability for the tax practitioner or serious investor. The system is designed to accept information, summarize data, compute tax and print the returns required by the Internal Revenue Service. The system's immediate response capability gives both tax specialist and clients immediate results of the computation.

The system reduces time required to complete a return while also minimizing the tax obligation of the taxpayer within the limit of the law. Three levels of tax preparation systems are available:

Level 1 — Uses 23 schedules and forms, handles multiple clients, and prints IRS approved forms.

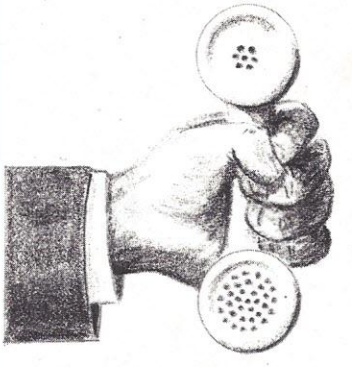
Level 2 — All of Level 1 plus six more schedules and forms, depreciation system, state tax interface, integrated data base for year to year data storage, and batch compute and print functions.

Level 3 — All of Level 1 plus partnership schedules and forms.

State tax computation for the following states is available at additional cost: Arizona, California, Illinois, Ohio, Oregon, Maryland, New York, Utah, Virginia and Washington, D.C.

Other states and municipalities are being added.

Prices:
Level 1 — $250
Level 2 — $1,000
Level 3 — $750
Level 2 plus Level 3 — $1,500
State Tax — Call for prices
Demonstration system — $75



4 WAYS TO ORDER

- Write Westico, Inc., 25 Van Zant Street, Norwalk, CT 06855.
- **Call (203) 853-6880.**
- Telex 643-788.
- Dial-up our 24-hour computer (300 baud) **(203) 853-0816.**

COD, MasterCard and VISA accepted.

Prices do not include shipping and are subject to change. In CT add 7½% sales tax. All sales final.

Manual price may be credited toward purchase of software.

Dealer inquiries invited.

Copyright © 1981 Westico, Inc.

WES-40

Send for **FREE** catalog

WESTICO

The Software Express Service

25 Van Zant Street • Norwalk, Connecticut 06855
(203) 853-6880 • Telex 643-788

ers to small businesses in our industry," says Bill Hess. "Some of our customers play a little game with the three of us. They buy from one of us and don't pay. Then, they'll buy from supplier number two and won't pay. Finally, they'll buy from supplier number three. By this time, they'll usually have enough money to pay off the first supplier. After they pay him off, they'll order from him again and start the cycle all over."

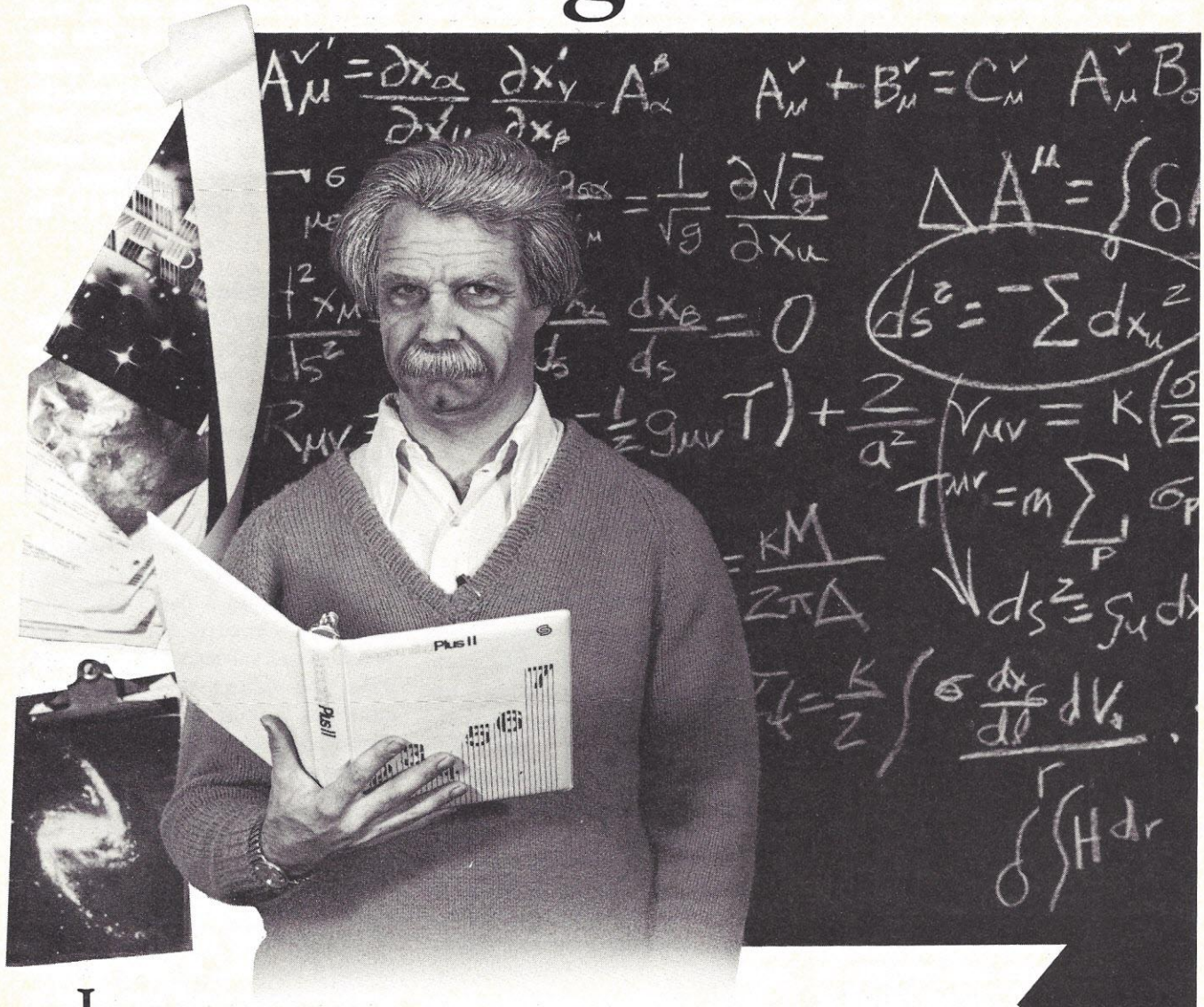
By aging its accounts receivable, A & A is able to identify those people. "We'll tell them that we'll be happy to ship their order C.O.D., but if they complain that they are good customers and pay regularly and shouldn't have to pay on delivery, we print out their file and give them the evidence. Before we had our computer we weren't able to do that. The problem accounts were very difficult to find.

"We used to pay an outside accounting firm $500 a month to do our books," Hess says. "It would take three weeks to get our material back so that we could send out bills. Now we can get 400 invoices printed, stamped and mailed in four hours. Our billings get out faster and we get paid sooner."

The $500 a month that A & A used to spend to get its accounting done can buy a lot of hardware. The hardware A & A chose consists of three Intertec Data Systems Compustar computers, each with 64k of RAM and two disk drives. Each computer has access to a 10 megabyte hard disk. The printers are a Texas Instruments Omni 800 and an NEC Spinwriter.

With tightened up receivables

Accounting Plus II
It Figures



It figures that the same people who brought you Accounting Plus* on the larger computer systems wouldn't forget the Apple.** Accounting Plus II brings to the Apple Computer a completely integrated, easy to use accounting system. Accounting Plus II doesn't require any special hardware, only 48K of RAM and two floppy drives or hard disk, and you don't have to be a CPA to use it. Accounting Plus II organizes and streamlines your paper flow and generates checks, invoices, statements and purchase orders on pre-printed forms. The system supports a solid audit trail which your business requires and your accountant demands.

Modules now available:

- General Ledger
- Accounts Receivable
- Accounts Payable
- Inventory with purchasing

For additional information call or write
Systems Plus Inc., 3975 East Bayshore,
Palo Alto, CA 94303 Phone 415/969/7047

Seeing is believing.

Systems Plus

*TM of Software Dimensions, San Jose, CA
**TM of Apple Computers, Cupertino, CA

comes a better cash flow. More money comes into your business because bad debts are minimized. More cash on hand saves money on interest since you have to borrow less. If you do need to borrow money, your computer can help you there also.

"You just push a button and print out your accounts receivable," Tyson Hess says. "Then you just bring the printout down to your banker and ask for a loan."

Money in your pocket

The less inventory on hand, the more money in your pocket. Without a computer, it is very difficult to keep a handle on everything that's in stock, especially if you happen to own a company that sells parts. A & A uses its computer to identify which parts sell the fastest and which sell the slowest. "We sell a lot of different items," says Tyson Hess. "Some could sit here for years and we'd never know. Now, we run an inventory report and see what we have. If something isn't moving, we find out, since the same item appears on every report. Then we make a special attempt to sell it and our bad inventory is turned into cash." Through the use of a computer, Hess claims a 20 to 30 percent decrease in the size of the company's inventory.

"This has also increased our turnover rate," he says. "Where we used to have a turnover one to four times a year, our inventory now turns over six to eight times a year."

> "Some people think there's some kind of sex appeal in putting everything on a computer, but you need to take it one step at a time."

Forecasting hamburgers

Nye's firm manages a chain of fast-food outlets in southern Texas. One of the major goals for a fast-food outlet is to give prompt service to customers. Using sales patterns compiled on an hourly basis for the preceding six weeks, the computer helps to predict how many employees are needed for every hour of each day. "We know for example, that we need 12 people to have a $700 hour, but we need only three people for a $100 hour," he says.

Nye, whose computers include three TRS-80 Model IIs, an Altos system with 10 megabytes of hard-disk memory and an Intertech Data Systems Superbrain with two disk drives and 64k of RAM, adds, "We forecast each hour's sales and staff our people accordingly. This gives our customers better service by having enough employees to service them at peak hours. This also lowers our payroll costs, which are typically one and one-quarter times the gross salary by not having too many employees on hand during slow periods." Nye says that better service also builds future sales. "Using our method, we can serve a customer his food within 20 seconds after he places his order, which is three times faster than the national standard for the chain."

While a computer may help you to use your people more effectively, Nye says that it won't replace anyone. "I've never seen a case where a computer replaced someone," he says. "A computer won't help you replace employees, but it may keep you from having to add more." In an office environment, Nye says, the computer almost raises employees from the clerical level to the management level because they are performing duties, such as preparing reports, that only managers used to do. With programs like VisiCalc, those reports can easily be prepared by clerical personnel.

To be more efficient with materials, Nye designed a Standard Costs program for the chain, which allows him to determine the cost for each hamburger sold. Costs are then updated on a weekly basis. By comparing forecasted to actual costs, the program can identify spoilages, theft and giveaway of product. "You won't miss two or three hamburgers, but you will miss as few as 10 or 15," he states.

Finding variances

The main way that Nye's firm uses VisiCalc is in programs similar to the standard-cost program. By forecasting budgeted amounts and comparing the budgeted amounts to the actual totals, variances are found. "Then, it's up to you to find out what the problem is," Nye says.

For construction clients, Nye separates each home or building to be constructed into a department and forecasts the costs for each one. When the actual costs are in, he compares the actuals to the expected costs and, with his client, tries to determine why variances occurred.

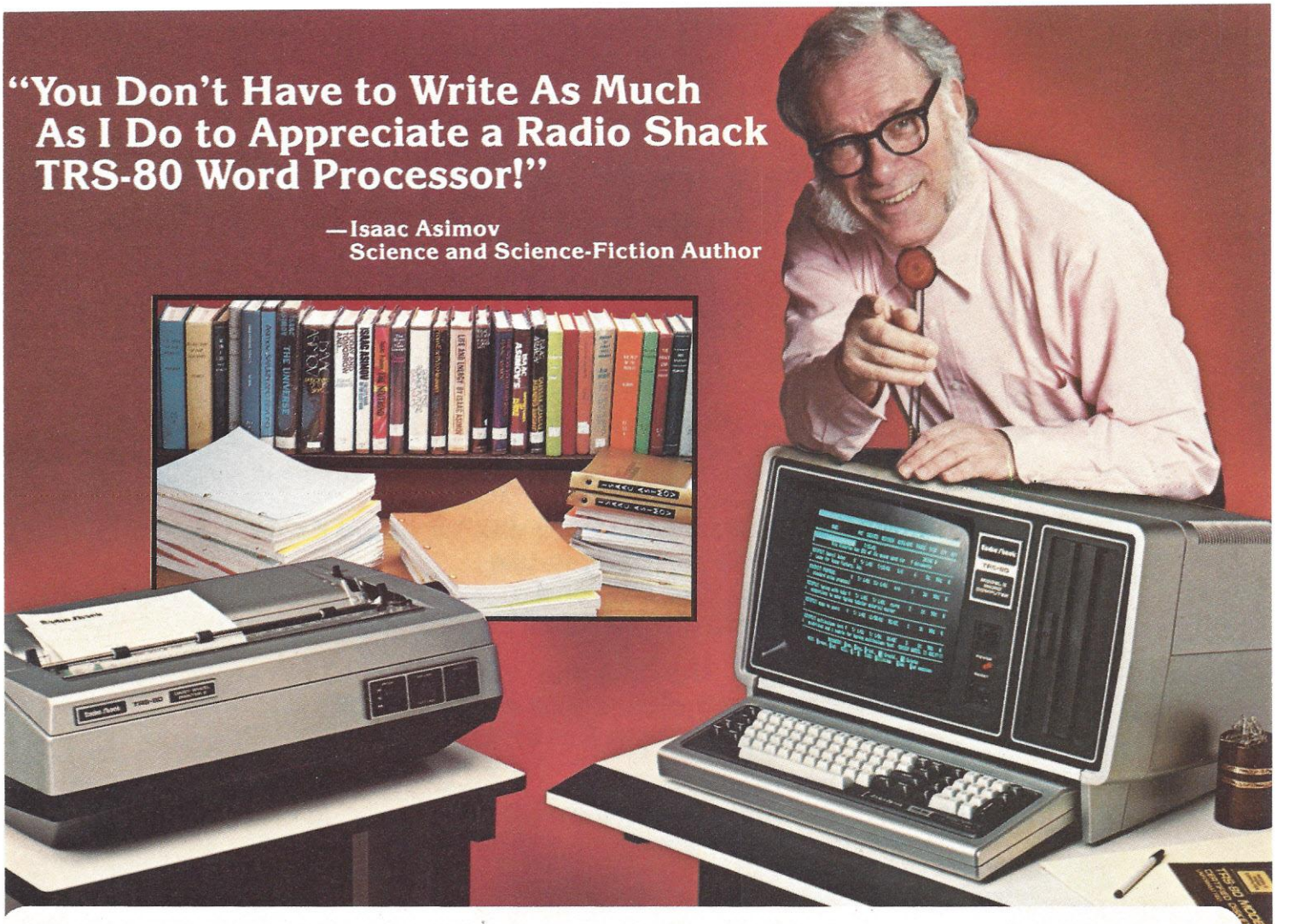
"Sometimes it's because of cost increases or because you expected to use a certain amount of material and used more," Nye says. "But once, we found that one of our customers was being billed 30¢ a pound more than he was supposed to be for a certain building material. Without our program, he never would have found it. It was buried in accounts payable. That one instance saved him 20 percent of his costs."

If you determine that your costs will increase through forecasting, you can offset some of those costs by buying now, instead of after costs go up. "We have one client who does that," Nye says. "His cash flow is good enough and he has enough inventory space to make his purchases before his costs increase. Presently, most companies just don't have enough

continued on page 153

"You Don't Have to Write As Much As I Do to Appreciate a Radio Shack TRS-80 Word Processor!"

—Isaac Asimov
Science and Science-Fiction Author



Any Job You're Doing on a Typewriter Can Be Done Faster and Better With the Top-of-the-Line Radio Shack TRS-80® Model II and SCRIPSIT.™

"A TRS-80 Word Processor Isn't Just For Novelists!" Isaac Asimov uses a Radio Shack Model II and our SCRIPSIT program because he does a tremendous amount of writing. But you don't have to be a best-selling author to benefit from word processing. If you prepare memos, letters, forms or reports—you need a Model II word processor, too.

"It's So Easy!" When an idea strikes, Isaac heads for his Model II. "It's a snap to compose, then edit what I write, because it's all done on the screen—electronically! When the story is just right, I print it—letter-perfect—on my Daisy Wheel printer. And at 500 words per minute, it sure doesn't take long. In fact, it's fantastic!"

"I Was Once Terrified of Word Processors!" That was before Isaac discovered TRS-80. "Radio Shack's audio cassette training course and excellent reference manual—both included with SCRIPSIT—made me a 'pro' in no time!"

Our deluxe TRS-80 word processing system—including Model II computer, SCRIPSIT 2.0 software, SCRIPSIT Dictionary, Daisy Wheel II printer, and external Disk Drive—is just $7646. Other TRS-80 word processors start as low as $2932.95.

"Saves Me Time and Effort." It's a snap to insert, delete, move and duplicate text material with a couple of keystrokes. "If I don't like a word, sentence—even a whole page of copy—I just 'zap' it away!"

"No More Misspelled Words!" Isaac loves our new 100,000-word SCRIPSIT Dictionary, too. It "proofreads" his copy for spelling errors and shows where to hyphenate. "The Dictionary even lets you enter words unique to your line of work, so I can add hundreds of scientific terms."

See It Today! Get a demonstration at a Radio Shack Computer Center, or expanded computer department in selected Radio Shack stores and dealers near you!

Send me your free TRS-80 Computer Catalog!

Mail To: Radio Shack, Dept. 82-A-415
1300 One Tandy Center, Fort Worth, Texas 76102

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Retail prices may vary at individual stores and dealers.

Radio Shack®
The biggest name in little computers™
A DIVISION OF TANDY CORPORATION

CIRCLE 10

BIRTH OF A STAR

Starfire 5™ from CORONA

5 Megabyte Winchester hard disk for Apple II
$2995, ready-to-use
The only one
For ONLY Apple II, so you can be sure it's well thought through

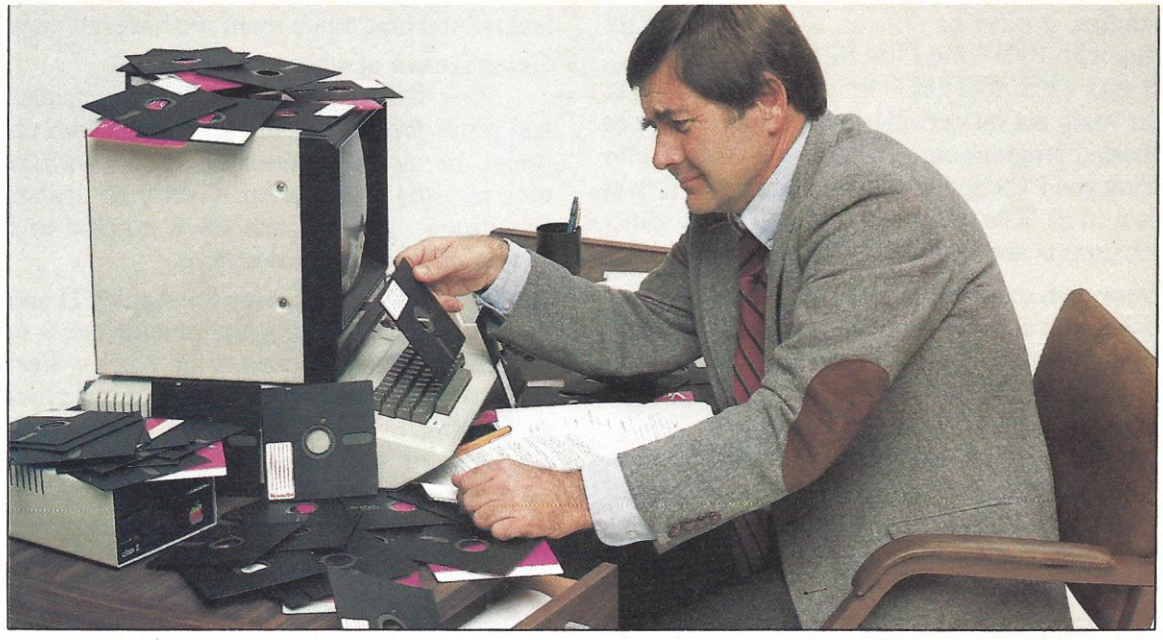
The only one
With a true hard disk version of Apple DOS
To make your Apple II even friendlier:

- Double size volumes optional, allowing double size files
- Named volumes and complete volume directory
- Search disk for a file
- Boot to any file in any volume
- Fast backup utility
- Single keystroke program execution
- Allows booting VisiCalc and other protected software in the usual way
- Allows automatic channeling to Starfire of references to diskette drives

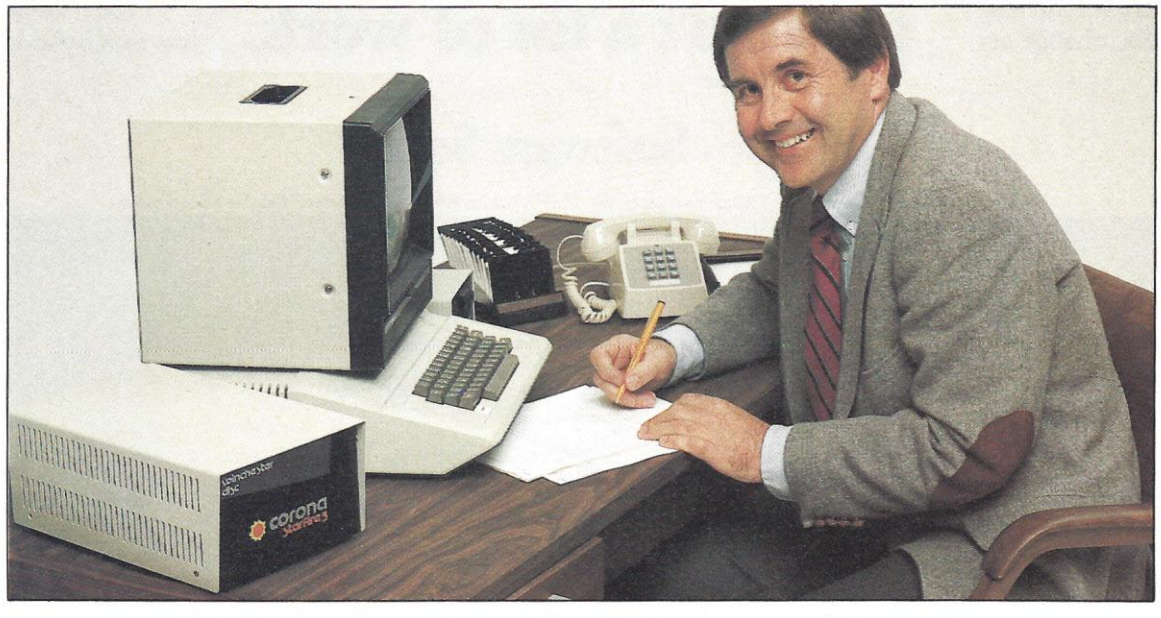
and with
DataGuard automatic data protection (32-bit ECC)
Optional CP/M, Pascal, Nestar cluster, and
1 year warranty

Starfire 5
The only one

Apple II is a registered trademark of Apple Computer, Inc.
VisiCalc is a trademark of Personal Software Inc.
CP/M is a registered trademark of Digital Research, Inc.



Starfire 5. The disk drive that won't play hide-and-seek.



What do we mean by that?

You chose the Apple II, and it's a good computer choice.

But Apple diskette drives play hide-and-seek with your valuable data.

And if you're not looking for a diskette, you're worrying about scratching one.

Besides, they're just too slow and hold too little.

That's why your Apple II needs a REAL business partner.

Like Starfire 5, the 5 Megabyte Winchester disk from Corona.

The one that holds 38 diskettes of data, available instantly, and can alphabetize a mailing list 5 to 10 times faster.

The one that seals your data off from danger and insures it with DataGuard automatic data protection.

Double-volume data files.

And best of all, Starfire 5 lets your files be twice as long, beating a crucial limitation of Apple's disk operating system, without abandoning it.

That's the kind of partner your Apple II needs to let it fulfill its computer promise.

At $2995, it's quite a deal.

So ask your dealer to show you Starfire 5 from Corona.

Or call us for the local dealer who can.

Because Starfire 5 is the BUSINESS partner for your Apple II.

corona data systems

213-998-0505
21541 Nordhoff St., Unit B, Chatsworth, CA 91311

CIRCLE 11

Many people think just because a computer does difficult things, it must be difficult to operate. Not so. At least not with PFS™ and PFS: REPORT.

PFS and PFS: REPORT let you concentrate on doing your work, not on working your computer. There's no complicated programming or computer language to learn. Using the PFS Series is so straightforward, you can learn it in as little as 20 minutes, and that's something both experts and beginners can appreciate.

Design your own management system, simply.

PFS lets you arrange your information in "forms" you design yourself. Once you've created your form—with spaces for all the necessary data—you simply fill in the blanks.

If you don't like the original form, PFS lets you change *just* the form, without having to totally re-enter the information on it.

To use your forms, just call up the information you want in a variety of ways such as "less than," "more than," "equal to," "between" or "not." You can even find specific characters, words, names or numbers. And PFS can also sort labels, change its 40-column format to accommodate larger printouts, and tell you how much room you have left on your disk.

Get more out of what you put in.

PFS: REPORT sorts, calculates, totals, formats and prints *presentation-quality* reports with up to 9 columns, in alpha or numeric order, with automatic entering and justification. With your information in this format, you can analyze it quickly to help spot trends, plan and make decisions.

A whole family of software for Apple® II and III.

PFS consistently ranks among the 5 top-selling business software packages for Apples. Because you can use it for almost anything—from chemical analyses to keeping track of your wine collection, from balancing your checkbook to computing your payroll. And there are more programs on the way.

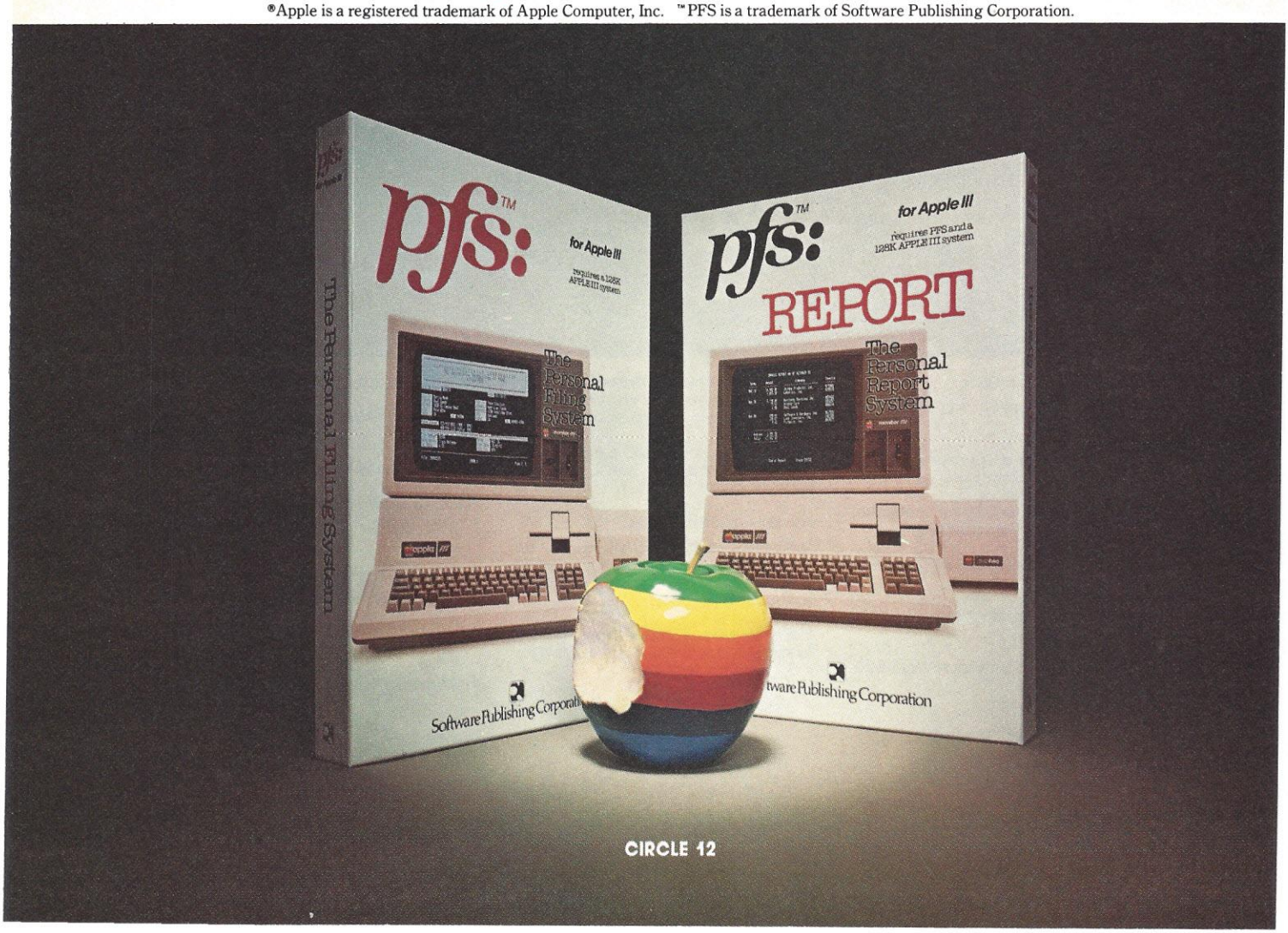
For a free, hands-on demonstration of PFS and PFS: REPORT, stop by your local computer store. If they don't have it yet, tell them to call Software Publishing Corporation at (415) 962-8910. Or write 1901 Landings Dr., Mountain View, CA 94043.

You'll be amazed at how much you can bite off.

Hardworking software for Apples that isn't a lot of work.

pfs:™ Software Series

®Apple is a registered trademark of Apple Computer, Inc. ™PFS is a trademark of Software Publishing Corporation.



CIRCLE 12

The power of purchasing by computer

Managers are exercising their purchasing talents with the aid of manageable, computerized data

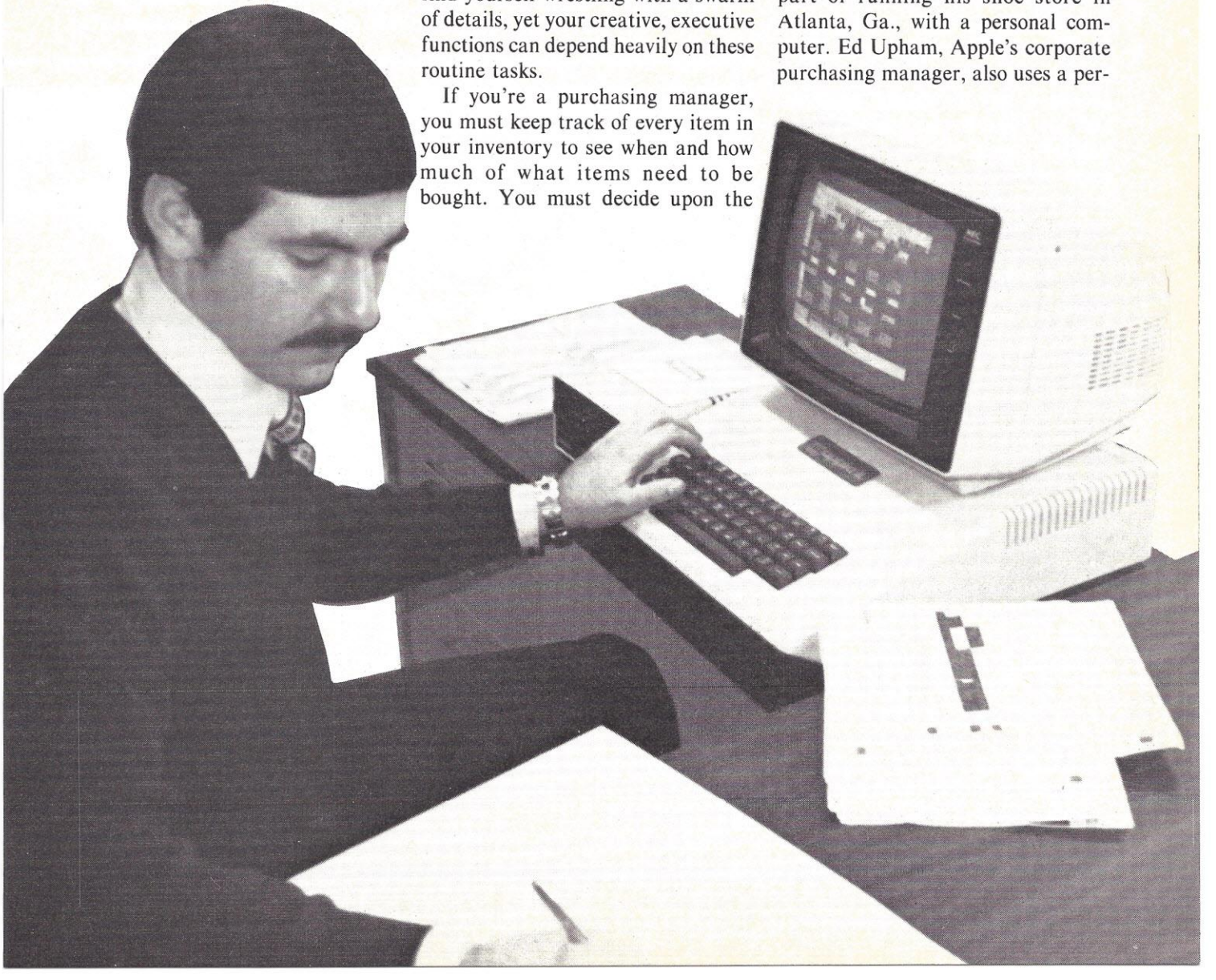
Whether you run a one-room schoolhouse or a large corporation, your job is likely to have its tedious and routine aspects. You may find yourself wrestling with a swarm of details, yet your creative, executive functions can depend heavily on these routine tasks.

If you're a purchasing manager, you must keep track of every item in your inventory to see when and how much of what items need to be bought. You must decide upon the vendors from which to buy, and which products to buy from each vendor you choose. You must also track purchases from the decision-to-buy stage to the actual delivery.

Each of these areas can give a manager scope to exercise his talents, once the relevant data have been massaged and maneuvered into a usable form.

There are three ways to get this information into a suitable form. You could spend your evenings and weekends working on it. You could find a small army of tireless, devoted vassals with errorless mathematical and statistical abilities to work on it. Or you could automate.

Bernie Petrocelli chose the third option. He automated the purchasing part of running his shoe store in Atlanta, Ga., with a personal computer. Ed Upham, Apple's corporate purchasing manager, also uses a per-



sonal computer for many departmental functions.

The experiences of these two men are instructive for anyone who wants to alleviate tedium and have more time for managing. You may be involved in manufacturing, or distribution and selling, or simply have an interest in the inner workings of business. Whatever your field, you should profit from knowing what these and other managers have done to improve the purchasing function at their firms.

Purchasing management is a kind of frontier in the world of personal computers. Software specifically intended for this function is just beginning to appear. Presently, two types of broad-function software can be used: data-base managers and numerical spreadsheets like VisiCalc.

Data-base managers work like an electronic filing cabinet/file clerk combination. They can keep and update lists, sort for desired qualities, and they usually generate various types of reports. You can use them to enter inventory figures and vendor information, and run a sort for which vendors supplied a given item. You can also find out which parts are needed by simply calling up the electronic card for that item. The main advantages these automated procedures have over manual systems are their ability to cross-file and the way they compactly store data.

Numerical spreadsheets let you ask "what-if" questions. You can set up a large electronic sheet with everything you buy in columns and everyone from whom you buy in rows. You can enter a change into the program—like what would happen if you bought all of your lawnmower blades from vendors with 60-day terms, but at a higher price. The program can then tell you what the net financial impact would be.

There's no substitute for your own good judgment here. Computers give you the opportunity to base that judgment on better facts—facts that are more immediate, more accurate and based on a large number of sorts and number-crunching routines. Nor can purchasing be readily automated unless some other functions are automated first.

First things first

Bob Wickham, Vector Graphic's vice president of marketing, says that accounting is the first function businesses usually put on a computer. It's the easiest to justify in terms of giving a tangible return on the hardware/software investment. Next comes order entry, inventory control and the other functions such as bills of material and purchasing.

A bill of material, or parts explosion, tells you what parts are needed to assemble a given item, and also tells you the total quantity of parts needed for several of the given items. Based on information in the data base, you can then determine which vendors sell the items, and at what prices.

Although a computer can be helpful in automating a business, it has its limits. In purchasing, that's defined by the number of items in your inventory weighed against how long you're willing to wait for the computer to digest your data.

Wickham says that companies with 200 or 300 employees would benefit from this computerization, but companies with only several dozen employees could also benefit if they have large inventories that need to be maintained.

A larger computer, with more power and speed, doesn't come cheaply, though. Networks of inexpensive, powerful personal computers may do the job for much less.

For example, several years ago Wespercorp in Tustin, Calif., bought a large machine for $450,000. Randy Knapp, who oversees purchasing and is the company's CEO, says, "We got the whole system in and it didn't meet our requirements. I'm not saying it was bad. Communications between our company and the supplier were somewhat faulty. They were eager to sell to us and we were eager to buy, and we failed to listen to each other. At one point I thought we were going to have to scrap the machine. What we did was hire the chief programmer from the computer company and he got it running. But knowing what we know now, we could take the software and put it into a small, complex network of personal computers instead of a single-base system, and it would be a lot less expensive."

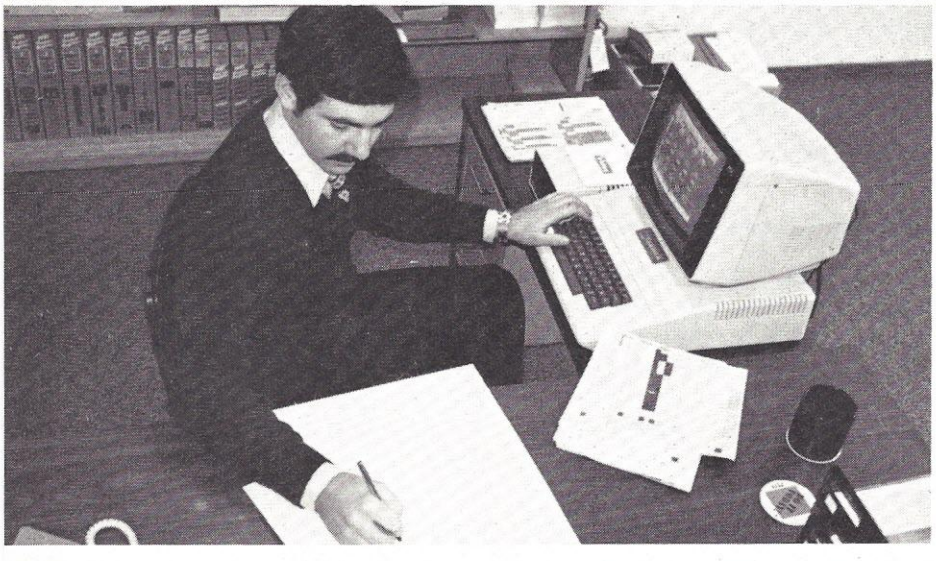
Knapp also has some ideas on what

PHOTOS BY THOMAS GAINEY

range of companies could benefit from automating purchasing procedures. He feels that any company with over $10 million in sales should automate.

"We found that task orientation was good up to about $10 million in sales. That is when you have the entrepreneurs who run the company telling you what to produce, and everybody just starts producing. The systematization of the business really doesn't exist. Most high-technology businesses start that way." Knapp also says that a company building very complex products (or maintaining very large inventories) could start to have trouble at a much lower sales volume.

So how small a company could profit from computerizing purchasing? Knapp says, "The man who is running a nursery-supply business on the corner is a prime candidate. He is going cut his staff in half and increase his processing and his visibility in his market."



Shoes and savings

This is the case with Bernie Petrocelli, the owner of Southland Shoes in Atlanta, Ga. In this shoe business, Petrocelli keeps a large stock of mass-produced items—an inventory that fluctuates seasonally and evolves in a fairly regular way from year to year. He uses Systems Plus' Accounting Plus package with an inventory/purchasing module on an Altos computer. This is a fairly large investment for a retailer with one shoe store. So how much has it saved him?

"A couple hours a week," Petrocelli says. "It doesn't sound like much, but when you're talking about management time that you can then devote to running the business, supervising your employees, checking on your inventory and checking your receivables, it makes a big difference."

Just as with large manufacturers, Petrocelli's purchasing system is based on an inventory-control system. The inventory control helps purchasing in some obvious ways. It tells him how often a shoe sells and when. Less obviously, it helps keep that shoe from walking out of the store on an employee's foot instead of on a customer's.

"We spot check," he says. "We go in and pick an item at random and see if the numbers match. What has happened is that losses have decreased because employees know that you are random spot checking. Before, shoes would just disappear. There was only a manual count system that was performed every six months."

Petrocelli uses the purchasing module to keep track of items that are ordered on a repetitive basis, and must be paid on a repetitive basis. As he says, "I think of a purchasing system as one that has millions of dollars tied up in inventory and uses. . . MRP." (MRP stands for Materials Requirements Planning, a sophisticated institutional computer-oriented proccdure used by large companies.)

"I'm just not involved in that. Our business is relatively stable. A lot of it is purchase-order-type activity, where you buy the shoes now and you get the bill in 30 days, 60 days or 90 days. If you have a purchasing system, it ties into your accounts payable. For example, if I buy 50 pairs of shoes today and make a commitment for them, whether I pay for them today or 60 days from now, I have incurred a debt for 50 pairs of shoes," he says. "I might as well let my receivables reflect what my payables have incurred. The biggest mistake small businesses make is buying something that they've already bought and forgotten. They then buy the same thing over again."

Now that Petrocelli has computerized his store, salesmen have a hard time selling the same items twice. "I finally have something that gives me an edge." Petrocelli uses it, too.

"We look at what we have spent and what we have outstanding by vendor. We know who we owe what. We don't just want to know how much we owe, we want to know whom we owe."

Petrocelli also has another advantage over his vendors. "The machine disciplines the person using it. You have got to count. You have got to keep track. If your numbers don't match, your machine will not let you off the hook. It forces you to match your numbers."

The night watchman

Like Petrocelli, Ed Upham, Apple

Computer's purchasing manager, uses personal computers for purchasing operations. A multinational operation like Apple, with thousands of employees, must use larger computers at sometime. But Upham uses personal computers in ways many managers and small businessmen could profitably emulate.

Upham uses four types of software with his Apple II's: data-base managers and report generators, financial modeling, word-processors and telecommunications. All are standard, uncustomized software products.

He chose File Cabinet II from the Apple Software Bank as the department's data-base manager. VisiCalc provides financial modeling, and Micro Courier turns Apples into night watchmen for the world communication system Apple operates between its plants in Cupertino, Calif., Carrollton, Texas, Cork, Ireland, and Singapore.

Julie Hidaka heads Apple's purchasing request service station. Apple's 2300 employees have an average of 1500 or more purchase requests at any given time, and many of the people who request information need frequent status updates. The system makes it possible for Hidaka to help each employee without callbacks, since the speed of the program makes almost immediate service possible, as well as yielding a tremendous saving in aggregate employee-hours spent at this task. In addition to the requisition log file, the data-base manager is used to track the status of purchase orders, rejects, repairs and contracts.

The financial-modeling software is used by Upham for modeling the status of contract preparation. One of its prime functions is to help purchasing agents decide between negotiated total prices for all the products Apple buys from a particular vendor, or negotiating item-by-item prices. Without VisiCalc or a similar program, this work would tie up managers for days.

Tracking trends

Another vital function it performs is showing trends of standard costs. VisiCalc allows managers to track pricing trends and extrapolate them into the future. This, in turn, gives them firm extrapolations to take to Apple's financial people for budgeting. Purchasing agents benefit from the speed, the accuracy and the authority it lends their projections.

> "The person who set up our purchasing program is not particularly computer oriented and was not extremely familiar with the program. Yet it took her only a month to set up and implement it."

Apple Software Publishing Company uses PFS Report for its commodity file, purchase order file and accounts payable—including writing checks and vendor listings. These have greatly improved the lives of managers over the past five years. The unattended service capability of communications software like Micro Courier may have done even more for the home lives of managers involved in overseas operations.

With plants located literally around the world, a number of people would have to be at work in the middle of the night to service the working-hours needs of their global callers. Now they input messages into their computers with the order to transmit during the time the phone company rates are lowest. They then get their answers within a day. Operations like Apple need this interfacility communication for inventory balancing and purchasing.

Word processors like Apple Writer and Magic Window are used for contracts. These make it possible for a purchasing agent to agree on contractual changes with a vendor and give him the revised contract before he leaves the office.

Another area in which computerization can help businessmen is the area of cash flow. Upham believes cash flow is the small business number one problem. He says that VisiCalc-type programs enable the small businessman to accomplish what Upham's people do: forecast timing and amount of purchases needed, which works just as well for payroll and capital expenses. And they can also do profit-and-loss calculations.

Planning ahead

Jim Ferry at Atari uses VisiCalc on an Atari 800 to develop his buying plans. He gives this example: "We load in supplier capacities. We bounce that against the master production schedule, and we have the computer perform a mathematical analysis of materials allocation by supplier. This generates what would happen if volume goes up 10 percent. The computer then reallocates and we can see if it comes up with a known supplier's capacity.

"We have a rather large computer available to us in the purchasing department, but it isn't economical to put some reports into the large system. That's why I use our 800. I have easy access to it. It sits right there and we can use it as a working tool," Ferry states. "When I first got here we'd take a week to generate a buying plan for a major commodity. It would take that long to thoroughly analyze and assemble our plan. Now it takes less than 40 minutes, as opposed to two of us spending a week of

continued on page 148

FRIENDLINESS.
Informative HP manuals, helpful error messages, and automatic syntax checking make BASIC language programming easy.

EXPANDABILITY.
Just plug in the HP interface bus (HP-IB) and add up to 14 peripherals without disassembly.

12-DIGIT ACCURACY.
(Not just 9!) Thanks to BCD math capability.

FULL-SCREEN EDITING.
Edit the easy way – without retyping entire statements. Insert, change, or delete characters at the touch of a key.

HP SOFTWARE.
Powerful, time-saving solutions to your everyday problems.

PORTABILITY.
Keyboard, CRT, printer and storage – all in a 20-lb. package. So you'll have computing power wherever you need it... office, lab, field, or home.

INTEGRATED GRAPHICS.
Analyze a better way – with graphics. Document your results with hard-copy plots.

Hewlett-Packard put it all together.

The HP-85 personal computing system.

Leave it to Hewlett-Packard to put a lot of power in a little package. Plus flexibility, portability, and all the other features you'd expect to find in a personal, professional, integrated computing system.

Turn it on and the HP-85 is ready to go. You're off and running using HP software or creating your own programming solutions. There's no bootstrapping. And since the operating system and powerful BASIC language exist in ROM, they use almost none of the available RAM.

If you've been looking for a friendly, integrated computer with power and dependability, look at the HP-85.

We put it all together for you!

For further information, phone toll-free, 800-547-3400, Dept. 289B, except Alaska/Hawaii. In Oregon, call 758-1010. Or, write Hewlett-Packard, Corvallis, OR 97330, Dept. 289B. 611/22

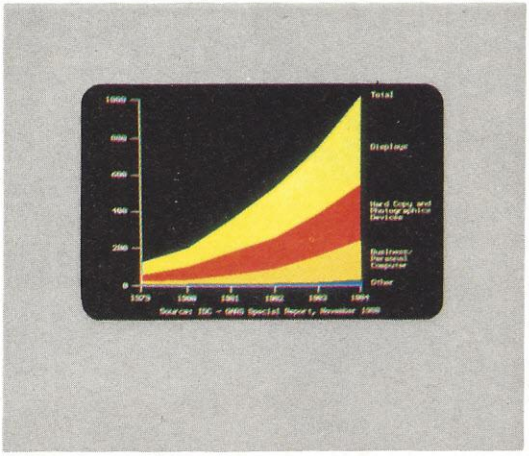
When performance must be measured by results.

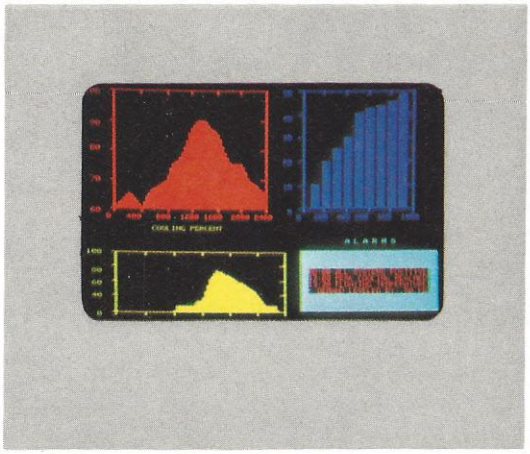
HEWLETT PACKARD

CIRCLE 5

Persuasion made easy with powerful presentations

If you could make someone instantly comprehend what all that data means, couldn't you sail through that presentation?





Ken McLamb

A picture can often be worth a thousand words, but in this age of super-abundant information, there are countless people in the business world who could certainly find a picture to be worth a thousand numbers.

Businessmen must understand sales figures by product, department, division, month, quarter or year, by region or territory, and all of these versus estimates for competitors, versus the future as projected from industry statistics and economic indices. They must also understand the conflicting formats of pricing and performance information that make it so difficult to choose suppliers wisely. Other companies' salesmen must also be understood, especially when they back a presentation with volumes of data that might justify an order, if the businessmen had a weekend to study all that data. But businessmen want to "get the picture" fast and move on to other work.

Computer-generated graphics can be a godsend for these purposes and for other types of business presentations. By converting quantifiable data into charts, graphs and other visual forms, a computer can provide nearly instant comprehension of perspectives and relationships.

Many pages of paper with row after row and column after column of data, which might take more time and more inclination than a decision-maker has for digging out what he wants to know, become recognizable at a glance. Highlights pop into view and significant variations call attention to themselves. For the preparer of the presentation, the result is an easier job of selling the product to a customer, or "selling" a proposal to the boss or the board of directors.

Like automated data processing, computer graphics used to be an esoteric function. Experts tended to it behind a no trespassing sign, and only well-heeled companies and institutions could afford it. Also like data processing, and trailing just behind it in development time, graphics is now descending into small workplaces.

The wider accessibility of graphics is made possible by today's personal-computer systems. Small businesses use them as the stand-alone equivalent of the mainframe computers in big business. Even companies of mainframe size are increasingly purchasing personal computers for managers and non-dp specialists to use, because they provide access to information in the main data base and permit each user to work with computing independently.

Big business or small, whether stand-alone or plugged into a distributed network, personal computers are capable of producing good graphics when the right peripherals and software are in place. Independent peripheral manufacturers and software houses have stepped in to provide programmed or programmable graphics for machines that don't have the ability built in.

Several of the leading original-equipment makers have recently introduced small-business models with graphics either integrated or available as an off-the-shelf option, and all have made the function as friendly as possible to the user. If you know how to operate the machine, you'll soon know how to generate presentation-quality graphics.

Counseling with computers

Frank Doe acquired DSS/F for the Apple II Plus used by his company, Manna Financial Planning, in Fairfax, Va. Doe himself is highly numerate—he's a certified financial planner—but he has a lot of clients who aren't. Doe counsels people on tax and investment decisions, and he says the impact of converting the numbers into pictures is "fantastic."

"I've put a 'tax thermometer' into the computer," Doe says. "I can key in the client's tax bracket and various investments under consideration, and an indicator will move up and down on the monitor screen to show the effect on disposable income. You can see the client's head moving up and down with awe as the meaning of all the numbers finally sinks in."

Doe frequently uses the system to present "fast facts" to a client, such as graphically showing the results of starting a retirement fund or a child's college-education fund, for the present year or in a given future year. He has stored the progressive steps of the five-year federal tax-reduction program into memory, as the steps relate to individual financial decisions.

The computer with DSS/F is a persuasive presenter, Doe says. One of his clients was a man about to be divorced, who didn't especially look forward to an upcoming discussion about alimony with his wife's lawyer. Doe printed out a graphic financial profile of his client, highlighting the

key numbers showing what seemed to be an equitable level of monthly alimony, and went along on the visit to the lawyer's office. "The lawyer studied the charts and said, 'Well, that's plain enough to see.' It was all over in less than 10 minutes," Doe states.

With the formats in storage, Doe is able to create completely customized "slide presentations"—the display actually used for this purpose is a normal TV screen—that show a client exactly where he stands financially and what could be gained or lost by certain courses of action. "It's his picture," Doe says. Displays can be moved forward or backward at will, as with a slide projector, and Doe has, in effect, incorporated a carousel on diskette, plus the option of printing hard copies at any time.

Sophisticated graphics

James E. George, a consultant based in Los Alamos, N.M., has played a leading part in bringing sophisticated graphics within the reach of personal-computer users. In association with Integrated Software Systems (ISSCO) of San Diego, he helped develop two of the most powerful graphics software packages now in use on mainframes. Each package costs more than the price of an entire, elaborate personal-computer system.

George personally uses an Apple II as a versatile tool in his consulting and teaching work. He has devised software for himself and others that permits an Apple to serve as an intelligent work station for a mainframe running the ISSCO packages, and has developed other software to enhance the graphics capacity of a stand-alone Apple.

"To me, the power of the personal computer is its flexibility," George says. "One moment it's a financial wizard with VisiCalc. Then it becomes a word processor with a spelling checker. Then it helps you create charts and viewgraphs on your own, or becomes an intelligent graphic work station, communicating with larger host computers but saving the resulting graphics for future use.

"Just as personal computers should not be ignored by host application software, the richness of the software and applications available on hosts should not be dismissed by personal-computer users who could have the benefit of that access."

The early development of computer graphics, George says, was characterized by poor image output quality, and the need for users to be technically knowledgeable and fluent in computer languages. But graphics systems are finally attaining the goal most other systems reached some time ago: availability to the end-user. The promise of graphics is being realized by today's combination of high-quality output, simplified use and inexpensive hardware.

"Computer graphics are useful to any organization that finds sheets of computer printout a cumbersome and ineffective means of understanding data," George says. "Graphics are also useful to those accustomed to the time-consuming process of having rough sketches rendered into presentation quality by graphic artists. The manual method has other drawbacks, too. Limited time and facilities often restrict an artist to the most elementary devices, such as different kinds of lines and shading. A person with little expertise in graphical data representation must also be able to experiment with various types of graphs to see which would create the desired impression.

"When the graphics are computerized, you can quickly and economically experiment with techniques for presenting information. A correctly chosen graph becomes a powerful tool for presentation and persuasion," says George.

In George's opinion, computer graphics has more nearly reached maturity as an aid in management decison making than for any other application, including the scientific uses that have received much attention.

"The computer's information-handling capacities are now being complemented by the ability of hardware and software systems to condense, code and display information in graphic forms, making large amounts of data comprehensible," George says. "As a result, managers can base their plans, decisions and actions on information that's more complete and more timely than it was before computer graphics. Graphs are communication devices used by managers to help each other confront problems and explore solutions. Along with techniques such as modeling and simulation, they expand the range of actions open to an organization's leaders."

Making connections

George generates his own presentations for clients, students and at workshops with his Apple II, a Qume printer and a Houston Instrument Hiplot plotter.

When he dials into a mainframe computer to implement software as a consultant, for example, George makes the connection with a 1200-baud modem and the TEKALIKE software that his company, Mesa Graphics, now markets to other Apple users who have access to mainframes.

TEKALIKE, as the name implies, turns the Apple II into an intelligent work station for graphics that emulates the Tektronix 4010-series terminals. A host computer's graphical data, intended for the 4010, is diverted to the Apple's screen and can be saved in its memory or on disk, for manipulation of scale and plotting on the screen or plotter.

For a stand-alone Apple, Mesa Graphics has two packages developed by George. The first is SOFTCHAR, a "subroutine library." A user having standard Applegraphics and pro-

gramming ability in the Pascal language can color, rotate and scale plots on the screen or on the plotter for printout. The resulting graphic can be dropped into a space left open on a page of a presentation prepared by word processing.

VUGRAPHS, Mesa's second package, requires no knowledge of programming. Using simple commands, the user can create displays composed of words in a choice of several typefaces that can be italicized, colored, rotated and scaled. Rectangles and lines can also be created, and can be adjusted for line thickness. Both packages require a 48k Apple, one disk drive and Applegraphics with Pascal.

Earning attention

The Apple II usually first earns the attention of third-party producers of software, plotters and various kinds of gadgetry dedicated to graphics creation. The parallel interface card called The Grappler, marketed by Orange Micro, is one example. It contains its own chip, enabling graphics from an Apple's screen to be dumped to any of several printer models without the need to load software routines.

Another approach to graphics upgrading is the combination of hardware and software from Maxtek, which is available to users of the TRS-80 Model II, the Superbrain personal computer and the Heath/Zenith Model 89. Maxtek's XCEL Graphics Unit hardware, when retrofitted to one of those models with 64k of RAM, gives the computer a black-and-white screen resolution of 512 pixels (picture elements) horizontally and 240 vertically. That comes to 122,880 bits of information defining the displayed image. Each pixel's on-off state is determined by a bit in the auxiliary unit's own 16k RAM.

You don't have to program all those pixels yourself. Maxtek has five complementary software packages, at a per-package cost. One generates lines, circles and other primary shapes with 90 degree rotation; another is a set of subroutines to display relationships between two sets of data

"Computer graphics are useful to any organization that finds sheets of computer printout a cumbersome and ineffective means of understanding data."

Choosing the right chart

You don't have to be an expert to create graphics with a computer these days, just as it's no longer necessary to be a programmer to generate data. But a poorly chosen or designed graphic will confuse the viewers of your presentation just as surely as incorrect figures or ambiguous words would.

To help beginners get a quick handle on the important aspects of effective graphic design, ISSCO has published a 40-page guidebook called *Choosing the Right Chart.* It was originally compiled as support for large-computer software packages, but the principles are universal. ISSCO will send a copy to anyone for $8.50. More information can be obtained from ISSCO, 4186 Sorrento Valley Blvd., San Diego, CA 92121.

To avoid false starts with the choice of possible charts, first write a "focus sentence" summarizing what you are looking for or what you want to show.

Typically, the message you plan to convey with a chart will be in one of four primary categories of patterns or relationships: a time series, to show changes in quantities over a period of time; parts in relation to a whole (percentages); comparisons between items or places, such as expressing sales figures by product line or market territory; and the relationship between two variables, such as tracking sales per employee against sales expenses per employee. The basic tools at your disposal are the pie chart, the curve, progression of steps, the bar (horizontal) or column (vertical) chart and the geographic map.

The following guidelines should be followed to make your graphics as persuasive as possible:

- When converting data to a visual image, it's usually best to be selective and include only the necessary points. An overly "busy" chart loses impact.
- To help guide the viewer's eye, make axis numbers large enough to read easily; a 0–5–10 progression with tick marks between will work just as well as small numerals through 10.
- Label curves within the chart when possible, rather than footnoting them, and make the curves thicker than the lines on a background grid.
- Use identical scales for each of the subjects in a comparison. If sales go to 100 in one market and to only 50 in another, it's best to run the coordinates up to 100 or more in both representations.
- Limit pie charts to no more than five segments.
- Whether working in color or black and white, order the shade patterns from darkest to lightest (from the bottom in a column chart; from the left on a bar chart), and avoid garishness in the use of stripes, dots and other shading effects.

Fill this space with a GRAFTRAX graphic and win a trip to Japan.

The Epson "Softwear" Sweepstakes.

We're looking for the Picasso of programming. So we drew up an art contest for people who don't know a painting pallet from a PROM.

If you've got an Epson printer, a computer and a little imagination, you could win a week-long trip for two to Japan. Or our top-of-the-line 136-column MX-100 printer. Or his and hers Seiko Quartz Watches. Or a whole lot of honorable mention prizes. And you'll get a T-shirt with the winning graphic just for entering.

All you have to do is program a GRAFTRAX graphic — abstract, landscape, still life, whatever — using an Epson MX-70, MX-80, MX-80 F/T or MX-100 printer. We'll not only put it on our T-shirts, we'll be displaying the winning entries for all to see in June at the National Computer Conference in Houston.

Why, you may ask, are we being so generous? It's simply because GRAFTRAX is the most incredible graphics capability made for micros. And we want to see it used to its full potential.

All entries will be judged on originality, creativity and best use of computer equipment. They must be postmarked no later than May 1, 1982, and be accompanied by the software program, so we can recreate the winning entries for verification. Make sure the graphic is no larger than 8" x 10" and no smaller than 4" x 6". And remember, if you digitize art or a photograph, it must have been originally created by you.

So get busy and enter. You might be a winner.

And your software could be your "softwear."

EPSON
EPSON AMERICA, INC.

3415 Kashiwa Street • Torrance, California 90505

EPSON "SOFTWEAR" SWEEPSTAKES RULES

1) Any computer equipment may be used to format the entry, but the graphics output must have been printed on an Epson MX-70, MX-80, MX-80 F/T or MX-100 printer with either built-in or optional GRAFTRAX. Winning entries will be re-created by Epson for verification.

2) Each entry must be accompanied by the software program used to create it. All entries and software and the rights to use them become the property of Epson America, Inc.

3) All entries must be at least 6"x4" and no larger than 8"x10" in size.

4) Art or photographs, if used, must have been created by the entrant.

5) All entries will be judged by an independent panel of judges on their creative merit, originality and best use of computer equipment. Decision of the judges is final.

6) This contest is valid from January 1, 1982 until May 1, 1982. Entries must be postmarked no later than May 1, 1982.

7) Participation in the Epson "Softwear" Sweepstakes is open to any except the following: employees of Epson America, Inc., its service agencies, or their families.

8) Winners will be notified by mail no later than June 1, 1982. A list of winners will be made available by sending a stamped, self-addressed envelope to Epson America, Inc., 3415 Kashiwa Street, Torrance, CA 90505.

9) Entries will be maintained on file at Epson America, Inc. until January 1, 1983.

10) Prizes are as follows: First prize includes round-trip economy air transportation for two to Tokyo, from the airport nearest the winner's place of residence, and six nights standard hotel accommodations, double occupancy. Trip does not include airport departure taxes, hotel service charges, cost of transportation or other expenses incurred before leaving the airport of initial departure, returning to Tokyo airport and returning home from the airport of initial departure; nor does it include meals or gratuities. Second prize consists of one Epson MX-100 Printer. Third prize consists of his and hers Seiko Quartz Watches. Additional prizes include 25 Micro-Nine Printheads, 50 Epson Digital Watches, and 100 Epson Ribbon Cartridges.

11) You may enter more than once, but each entry must be accompanied by the official entry coupon below.

12) Void where prohibited by law.

- - - - - - - - - - - - - - - - - - - -

Attach this form firmly to the back of each graphic you enter.

NAME _____

STREET _____

CITY _____

STATE _____ ZIP _____

PHONE (_____) _____

COMPUTER EQUIPMENT USED

_____

_____

PRINTER MODEL AND SERIAL NUMBER

_____

_____

T-SHIRT SIZE ____S ____M ____L ____XL

Mail entries to:

"SOFTWEAR" SWEEPSTAKES
Epson America, Inc.
3415 Kashiwa Street
Torrance, California 90505

EPSON
EPSON AMERICA, INC.

in several possible graph formats; there are surface plotter subroutines to display curved surfaces in true perspective with or without the removal of "hidden" lines; a 3-D generator constructs and manipulates points and wire-frame shapes to give the viewer the perspective of three dimensions; and the fifth program, like Jim George's TEKALIKE, emulates the Tektronix 4010 series.

Devices such as The Grappler, and even Maxtek's combination package, are general-purpose devices—they don't direct the user in a specific application. Some of the new developments in personal-computer graphics are in software aimed at helping the business manager quickly reduce numbers to an image someone else can easily understand.

Picking up

Personal Software, whose VisiCalc program is compatible with many machines, has followed with two packages (again, only for the Apple at the start) that graphically pick up where VisiCalc leaves off.

VisiPlot software permits the non-programmer to generate high-resolution graphs and charts, in up to six formats and colors, from data entered on the spot or downloaded from VisiCalc. The VisiTrend package goes one step further, establishing a "time series" according to any or all of several temporal coordinates and expressing the result in tabular or graphic form. This capability can be handy if your audience is not well skilled in multiple linear regression (forecasting) and the more subtle aspects of leads, lags and moving averages.

Another software package available is Addison-Wesley's Micro-DDS/Finance package, used by Frank Doe. Financial modeling and graphics are inseparable in this relatively expensive package, ($1500 list), requiring a minimum of a 48k Apple II with Pascal, two disk drives, a choice of black-and-white or color monitor, and, for hard-copy prints, an Apple Silentype printer. A version for Apple III is expected, with adaptations to other systems to follow.

Micro-DSS/Finance is designed primarily for financial managers and permits elaborate "what-if" manipulations of financial data. The features that make the package especially useful for presentations are its report generator and the built-in color graphics. Together with a compatible printer (currently the Anadex 9501, Qume, Epson MX100 and MX 80, IDS Paper Tiger 440 and several versions of the NEC Spinwriter), the package prepares letter-quality reports.

Pie charts, bar charts and line graphs can be generated one at a time by answering the menu questions. If the user builds a graph-specification file in the DSS/F editor, he can use the same set of charts with varying scenarios or as the visual equivalent of numeric formats for regularly updated data, such as monthly sales reports.

If the user is in a hurry, the answers to just five menu questions will prompt the package to scan the model and generate up to 100 "quick 'n' dirty" bar charts. A practiced user, says the package's publisher, can make a complex change in a report in 15 minutes, create a new format in five minutes or create a graph in three minutes. The package can also prepare a "slide presentation" of the same images to be shown on a monitor.

Capability and cost

Just about any personal computer now at work in a business environment is capable of generating and displaying graphic presentations if the right hardware and software accessories are at hand. Image quality and format flexibility depend on what's available for a given machine,

continued on page 84

Coming up in PERSONAL COMPUTING

March
Word-processing software

April
Communications products

May
Larger microcomputers

June
Educational software

July
Computer courses

August
Printers

September
Accounting software

October
Add-on boards

November
Business-planning software

December
Video monitors

In an age when new standards are constantly emerging, one disk consistently meets or exceeds them all.

Maxell. The Gold Standard.

Not all disks are created equal. Some are better than others. To find out what's best for you, look for Maxell disks. They now carry the Gold Standard symbol of quality. It's your assurance Maxell disks meet or exceed every definition of quality. No matter who establishes it. We've earned this universal superiority by never relaxing our uniquely demanding quality control. Every aspect of manufacturing is checked, then checked again.

Your benefits are many. Take the perpetual problem of drop-outs. A drop-out is a tiny defect that wastes time and degrades computer accuracy and performance. Now that you understand what a drop-out is, forget it. Maxell disks don't have any. Each disk comes to you certified drop-out free at the time of manufacture. You can depend on this quality protecting your valuable programs and programming time, indefinitely. We've run disks over ten million passes under conditions designed to find weak points and wear. We couldn't. And you won't.

There is a Maxell disk for the floppy system you use, or plan to use. Check your computer's instructions. Or write for our complete, highly informative brochure.

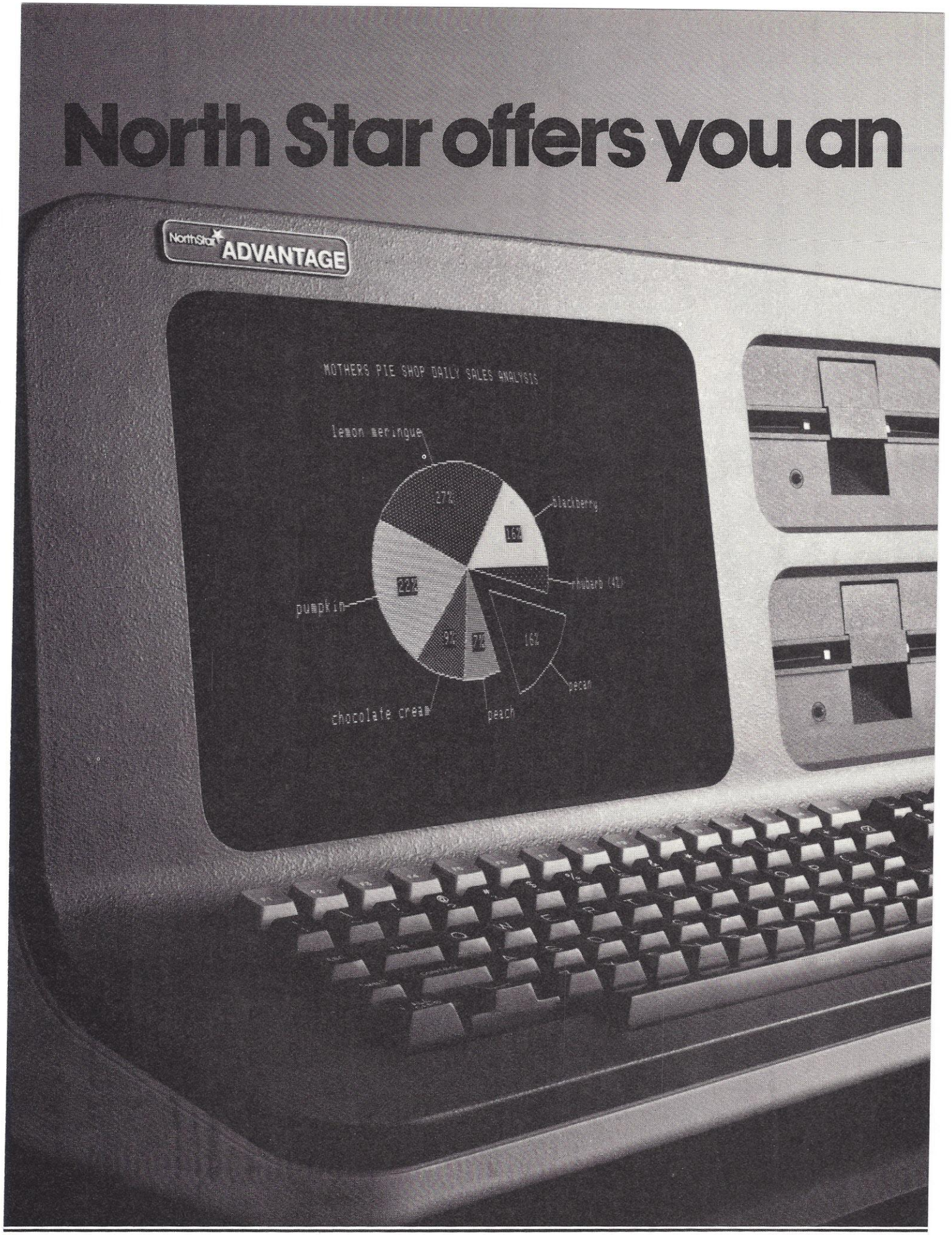
When you set the Gold Standard as your level of quality, you'll benefit from improved disk performance, immediately. Bank on it.

maxell®

Maxell Computer Products Division, 60 Oxford Drive, Moonachie, N.J. 07074, 201-440-8020

CIRCLE 19

North Star offers you an



incredible Advantage™ over IBM and Apple.

The ADVANTAGE™ desktop computer from North Star is better in every category than either the IBM Personal Computer or the Apple III. Compare for yourself!

Incredible Data Storage:
The ADVANTAGE has twice the diskette capacity of either the IBM PC or the Apple III. This means you have twice as much information at hand.

Incredible Graphics:
The ADVANTAGE gives you a higher precision display. A revolutionary software package called BUSIGRAPH™ is provided at no extra charge for preparing graphs, bar charts, and pie charts.

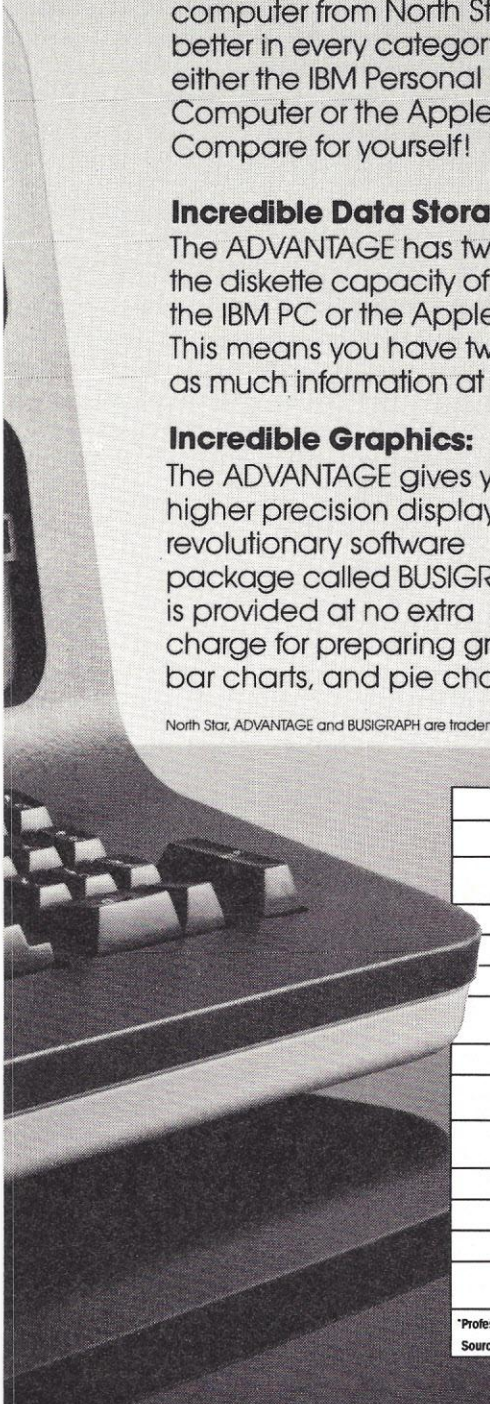
Incredible Software:
The ADVANTAGE is fully CP/M® compatible. Neither IBM nor Apple provides this ability to run the broadest range of industry-standard applications. In addition, only North Star offers 10 application packages for word processing, financial analysis, accounting and data base management.

Incredible Convenience:
ADVANTAGE is the only one of the three that's fully-integrated. It fits attractively on your desk without the clumsiness of the multiple-enclosure, multiple-cable approach taken by IBM and Apple.

Incredible Price:
The ADVANTAGE from North Star offers you the best in price/performance. You get more data storage per dollar invested, more applications programs, more available languages, and more graphics capabilities. At an incredible list price of $3999.

To find out more about our incredible family of desktop computers with graphics, call TOLL FREE 800-447-4700. (Illinois 800-322-4400, Alaska/Hawaii 800-447-0890.)
North Star Computers, Inc.
14440 Catalina St., San Leandro, CA 94577 USA (415) 357-8500.
TWX/Telex (910) 366-7001.

North Star, ADVANTAGE and BUSIGRAPH are trademarks of North Star Computers, Inc. CP/M is a registered trademark of Digital Research, Inc.



THE INCREDIBLE ADVANTAGE COMPUTER COMPARISON CHART*

	NORTH STAR ADVANTAGE	IBM PERSONAL COMPUTER	APPLE III
MICROPROCESSOR(S)	Z-80A Central processor 8035 Auxiliary processor	8088 processor	6502A processor
GRAPHICS DISPLAY RESOLUTION	640x240 pixels	640x200 pixels	560x192 pixels
DUAL FLOPPY DISC CAPACITY	720K bytes	320K bytes	280K bytes
CONVENIENT DESKTOP PACKAGE*	Yes, all in one enclosure	No, 3 enclosures	No, 3 enclosures
BUSINESS GRAPHICS SOFTWARE INCLUDED?	Yes	No	No
CP/M COMPATIBLE?	Yes	Partial	No
LANGUAGES SUPPLIED BY MANUFACTURER	Graphics BASIC, PASCAL, COBOL, FORTRAN, C	BASIC, PASCAL	BASIC, PASCAL
APPLICATIONS S/W PACKAGES SUPPLIED BY MANUFACTURER	10 packages	5 packages	5 packages
SELF-TEST DIAGNOSTIC	Yes	Yes	No
NATIONAL ON SITE SERVICE	Yes	No	No
MANUFACTURER SUPPLIED PRINTERS	Letter quality/matrix (136 columns)	Matrix (80 columns)	Letter quality/matrix (80 columns)
RETAIL PRICE PER KILO-BYTE OF DISK STORAGE	$5.55	$11.17	$15.57

*Professional configuration: Dual Floppy Disks, Monochrome Display, Keyboard, CPU, 64K bytes (or minimum) RAM Memory, and Printer Interface.
Source: Dataquest and Manufacturer's Literature, November 1981.

FOLLOW THE STAR
NorthStar™

CIRCLE 26

DOW JONES BLUE CHIP SOFTWARE GIVES YOU BLUE CHIP INVESTMENT CONTROL.

Never before have investors had the electronic capability to track and intelligently manage their own portfolios like this. Using Dow Jones' data base and exclusive portfolio management software you can store, modify and automatically update individual holdings on your own personal computer.

Now you have a remarkable opportunity to use software that can actually minimize risk and increase the chances for investment success—software that allows you to maintain multiple portfolios, automatically value each stock in your portfolio, obtain current quotes (15 to 30 minutes delayed during market hours) and historical quotes, retrieve year-to-date figures and compare them to the stock's original worth. You'll even be able to test the market with hypothetical portfolios—evaluating the "what-ifs" before you buy or sell.

More and more investors are becoming "bullish" about the DOW JONES NEWS/RETRIEVAL® Service—relying on it for instant business and financial data that can save hours of valuable time. You get exclusive electronic access to articles from The Wall Street Journal, Barron's and the worldwide Dow Jones News Service, in-depth background information on thousands of public companies, earnings-per-share forecasts, and much more. It's everything you need to better manage your business and personal finances.

When you make your software purchase, we'll give you a free Dow Jones password. . .as well as one hour of free introductory, non-prime time. And software and usage costs will be tax deductible in many cases (consult your tax advisor).

Find out about Dow Jones' unique ability to help you manage your own portfolio like a professional, improve and broaden your research capabilities, spot and analyze trends. Visit your nearest computer store or call the Dow Jones customer service hotline.

Call Toll Free
800-257-5114
(In New Jersey call 609-452-1511)

DOW JONES NEWS/RETRIEVAL® Service

©Dow Jones & Company, Inc., 1982

CIRCLE 14

Jason Birmingham and Betsy Gilbert

Computers investigate that research rapidly, reliably

With more than 950 data bases in operation throughout the U.S. and Canada, a world of information is literally at your fingertips

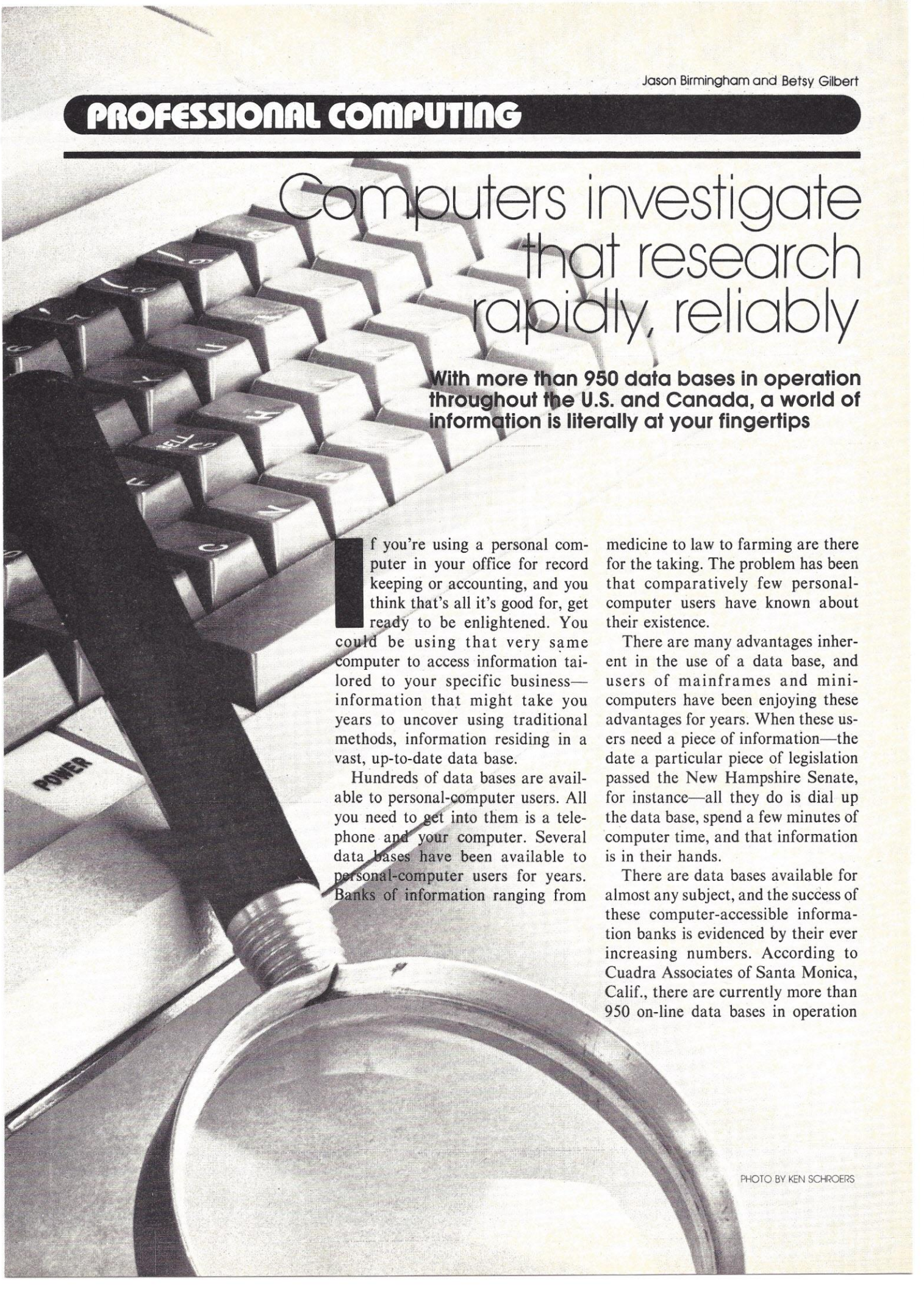


PHOTO BY KEN SCHROERS

If you're using a personal computer in your office for record keeping or accounting, and you think that's all it's good for, get ready to be enlightened. You could be using that very same computer to access information tailored to your specific business—information that might take you years to uncover using traditional methods, information residing in a vast, up-to-date data base.

Hundreds of data bases are available to personal-computer users. All you need to get into them is a telephone and your computer. Several data bases have been available to personal-computer users for years. Banks of information ranging from medicine to law to farming are there for the taking. The problem has been that comparatively few personal-computer users have known about their existence.

There are many advantages inherent in the use of a data base, and users of mainframes and minicomputers have been enjoying these advantages for years. When these users need a piece of information—the date a particular piece of legislation passed the New Hampshire Senate, for instance—all they do is dial up the data base, spend a few minutes of computer time, and that information is in their hands.

There are data bases available for almost any subject, and the success of these computer-accessible information banks is evidenced by their ever increasing numbers. According to Cuadra Associates of Santa Monica, Calif., there are currently more than 950 on-line data bases in operation

throughout the U.S. and Canada. At least 95 percent of them are accessible by personal computers.

"Any computer that can act as a dumb terminal can get into these data bases," says a Cuadra spokesman. "There are some geographical limitations, but generally speaking, anyone who has a computer and is willing to pay the charge can use on-line service."

There are data bases available to users for an hourly charge. Others charge annual fees plus hourly rates. Still others require monthly membership fees, in addition to hourly charges. Each data-base production firm has its own way of doing business. If a firm can justify the cost, then on-line information is the way to go.

A few examples

COMMODITY provides commodities brokers with more than 5000 monthly, quarterly and annual time series of supply-and-demand data for coffee, sugar, rubber, copper and tin. It contains data on production, consumption, trade, stocks and prices for approximately 150 countries.

CANCERPROJ provides the cancer researcher with summaries of ongoing and recently completed cancer-research projects funded during the past three years. It includes both federally and privately funded grants and projects, as well as non-U.S. funded projects.

Professional financial-management firms can turn to MONEY MARKETS, which contains financial statistics, historical data, interest rates, debt-market activity, money supply and Federal Reserve activity derived from Federal Reserve and U.S. Department of Treasury reports.

Using the resource

One user taking advantage of data bases is John Roper, a Houston investor. "My father invested in the stock market the old way," he says. "I'm doing it my way and I like the results I'm getting."

Roper uses an Apple II to access the Dow Jones News Retrieval Service and to get up-to-the-minute quotations on about 40 stocks he holds in a portfolio. The service gives him the high and low price for each stock and gives the stock's closing price at the end of a particular day's trading.

"I guess I'm just basically lazy," Roper says. "If I had to go through the newspaper everyday to get the information I need, I wouldn't be nearly as successful as I've been using the computer." Having the information you need displayed on a screen in seconds is much easier than searching through and obtaining the same data from the small print in the newspaper.

"If you're involved in active trading and you're dealing with some stocks that need to be watched closely, you're going to be in and out of Dow Jones every day," Roper states. "When you're working with highly volatile stocks, you've got to stay on top of the situation. I wouldn't feel on top without my computer and the data base."

As an added advantage, Roper uses Apple's Portfolio Evaluator package with the Dow Jones service. It allows him the luxury of sitting back and letting the computer do the legwork. It reads out the entire portfolio, recovers the current quotations, evaluates each individual stock and prints out a report for Roper to examine.

"All of this makes me feel like I've got an advantage over the other investors and brokers who are using the traditional methods," Roper says. "My father managed a lot of stocks and he only evaluated his portfolio once every quarter. I can evaluate mine once a day if I want to. What it all boils down to is this: I want to make money a little more quickly than my father did. To do that, I need current information and I need it in a hurry. With the Apple and Dow Jones, I've got what I need."

Doctor in the house

Other users who are putting computers to the test are doctors. A personal computer sitting in a physician's office is nothing new. What's being done with it today *is* new.

"Data-base access is keeping me up to date on new medical literature while saving me hours of poring over medical journals," says Dr. Ed Butler, a urologist with the Menlo Medical Clinic in Menlo Park, Calif. Using his Cromemco computer, Butler has been plugged into MEDLINE since July 1981.

As most doctors will tell you, getting through medical school is only the first step. A practicing physician needs to stay on top of new breakthroughs in the medical profession, particularly those breakthroughs that apply to his chosen field. Reading is the most practical way to accomplish that.

"When you're working with highly volatile stocks, you've got to stay on top of the situation. I wouldn't feel on top without my computer and the data base."

But where does the busy doctor find the time to read medical journals and get the latest information? The answer is simple: Find the right data base.

"When I want information on a given medical subject, I access MEDLINE, type in a few key words and I've got what I need on the screen in minutes," Butler says.

Actually, he doesn't dial MEDLINE directly. Like many others who've subscribed to the service over the past year, Butler goes indirectly through a serice called Dialog (owned by Lockheed), which makes a monthly tape of MEDLINE's information bank and offers it to subscribers.

MEDLINE provides access to worldwide biomedical literature, including research, clinical practice, administration, policy and healthcare services. It contains references to articles from 3000 journals published in the U.S. and in about 70 other countries, as well as chapters and articles from selected monographs.

"If I want to see what's being written on prostate cancer, I key in the words 'prostate' and 'cancer' and MEDLINE comes back with the number of recent articles available on each individual subject, and on the two as related subjects," Butler says. "Then I can ask it for a given number of titles. If I've got 10 titles and I'd like to explore three of them, I can ask for abstracts. The data base will give me a paragraph on what's contained in each article for which I've asked."

Some of these abstracts may contain material Butler would like to keep for his files. He can then print it out in his office or he can call Dialog and have the material printed and mailed to him in a few days.

"I'm interested in what other people have discovered regarding different aspects of medicine," Butler states. "MEDLINE gives me access to a list of references and abstracts pertaining to the subject I want to explore. It's also proving to be a valuable tool to other specialists in the clinic, witnessed by my growing popularity around here."

On the farm

Another data base available to computer users is AGNET, used primarily in agribusiness. As *Personal Computing* has already reported (see "Cultivating by computer," *Personal Computing,* November 1981, page 38), AGNET was developed in 1975 by the staff at the University of Nebraska. The service offers a scientific approach to farming, taking much of the guesswork out of such activities as crop rotation, livestock trading and feedng procedures.

Gerald Schmidt, a Southern Nebraska farmer, has not changed his opinion of AGNET since November. "We spend an average of $400 a year using AGNET, and believe me, it's money well spent. This service allows me to do things I could never do on my own."

FEED MIX, one of the AGNET programs, has simplified the care and feeding of Schmidt's cattle. He simply keys in current feed ingredients, and the program tells him how to build a balanced ration depending on the weight gain for which he's aiming.

"Before we got into AGNET, I went through the feed companies to get the proper mix," Schmidt says. "When I wanted a new mixture, I'd go down and give them the ingredients and I'd get the results back in a couple of weeks. If someone wanted to sell me a more expensive ingredient, all he had to do was doctor the results. This way, I'm doing it myself and I'm getting my results back in just a few minutes."

The Schmidt farm has also benefited from AGNET's marketing information and charting service. A charting-assist program aids the farmer in watching the futures market for a variety of commodities—in the Schmidt's case, cattle and soybeans.

AGNET also offers a variety of budgeting and purchasing programs to help the farmer decide on the feasibility of financing purchases or buying them outright. Additionally, it serves as a *Consumer Reports* for farmers, rating various pieces of farm equipment, recommending some and warning against others.

"Having this computer and being able to dial AGNET when needed makes all the difference in the world in running this farm," Schmidt states. "We're more efficient, we're more profitable and we worry a lot less."

"The concept of a computerized information library is a modern phenomenon that's going to get bigger and bigger."

Data-base business

Fred Bellomy is yet another user who takes advantage of data bases, and he can tell you everything you need to know about accessing them. He accesses about 300 of them with his DSC-2 computer.

Bellomy doesn't just use data bases to enhance his business. Data bases *are* his business. His firm, The Info-

continued on page 86

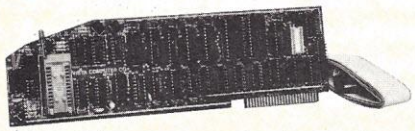
MODEL GB75©
Typewriter Interface

Apple to IBM Electronic 50, 60, 75 Typewriters Interface

- Reads IBM keyboard in parallel with Apple keyboard
- Supports the IBM code functions using an escape sequence
- Types at about 13 characters per second
- Prints from Integer or Applesoft programs
- Supports the "Control I Number N" parallel line length mode sequence
- Has switch selectable upper/lower case I/O. 60, 66, 78 continuous form feed page lengths, 40+video, 80, 95, 132 character line lengths

Suggested price **$195.00**

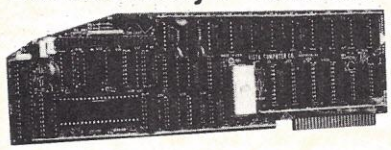
PROM DEVELOPMENT SYSTEM©



- Menu driven program development monitor
- Programs 2708, 2716, 2532, 2732 and 48016 EPROMS
- Simulates PROM from RAM
- Data and address interface for operator location and control
- Complete user documentation

Suggested price **$295.00**

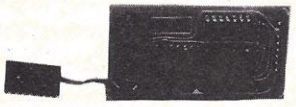
MODEL A800©
Double Density 8" Controller



- High speed DMA transfer of data (1 micro-second/byte)
- Complete documentation provided — includes theory of operation, source code for DOS enhancement utilities, schematics and diskette
- Uses all standard Apple DOS commands (OPEN, CATALOG, LOCK, DELETE, LOAD, etc.) except for INIT which has been improved and enhanced in a Vista format routine
- Compatible with Apple DOS 3.2/3.3, Pascal 1.1 and CPM 2.2 (with the Z80 soft card by Microsoft)
- 2K x 8 PROM contains Autoboot functions and all eight-inch floppy driver code allowing complete compatibility with Apple DOS 3.2/3.3

Suggested price **$595.00**

MODEL 150©
Type Ahead Buffer



- Up to 40 character type ahead capability
- Enter commands or data while your Apple is processing previous instructions
- Compatible with all Apple computers, keyboards and software
- No cuts — no jumpers — no software patches required
- Includes complete instructions for quick and easy installation

Suggested price **$49.95**

you have one apple.™ now get a whole orchard

of apple add-ons from

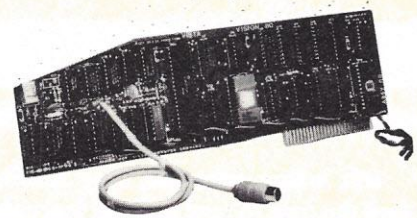
Vista COMPUTER COMPANY, inc.

1317 East Edinger
Santa Ana, CA 92705
714-953-0523
800-854-8017

Available through your local computer dealer.

© Copyright 1981 Vista Computer Co.
™Apple Computer Company, Inc.
™Digital Research, Inc.

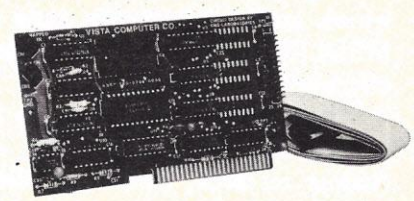
VISION 80©
Video Display Card



- Full upper and lower case character capability with 3 dot descenders
- 9x10 dot matrix per line U.S. (9x11 Europe)
- 128 ASCII character set
- BASIC, FORTRAN and Pascal languages supported
- Z80™ and CP/M™ compatible
- Compatible with all standard Apple™ peripherals
- Shift and lock for upper and lower case
- Source switches between 40x24 and 80x24 software and hardware
- Rated #1 video card by **Softalk** and **Call Apple**

Suggested price **$375.00**

VISION 40©



Softscreen programmable character/generator card for the Apple II computer

- Allows use of DOS tool kit upper/lower case character sets in Apple 40 column mode
- Permits creation of new alpha/numeric and graphic characters under Aminatrix
- Ideal for non-English language applications
- Compatible with most popular word processing software packages

Suggested price **$165.00**

TIMECARD III©

Multi-function time utility for the APPLE III computer system. Contains the year of the century, the month, the date, the day of week, the hour, the minute, the second.

- A countdown timer with a range of one millisecond to 999 hours, 59 minutes, 59 second, 999 milliseconds
- Selectable 12 or 24 hour time formats
- Diagnostic error reporting
- Fully compatible with the APPLE SOS operating system

Suggested price **$149.00**

MUSIC MACHINE 9©

- State-of-the-art, LSI sound generator technology (General Instruments AY-3-8910)
- Full eight octave range (32-7990 Hertz)
- Built-in stereo capability
- Complete computer control of tone/noise generators, stereo mixing, output amplitude and sound envelope generation
- Utilities provided allow use of popular computer music albums and related software

Suggested price **$129.95**

CIRCLE 23

Alan Radding

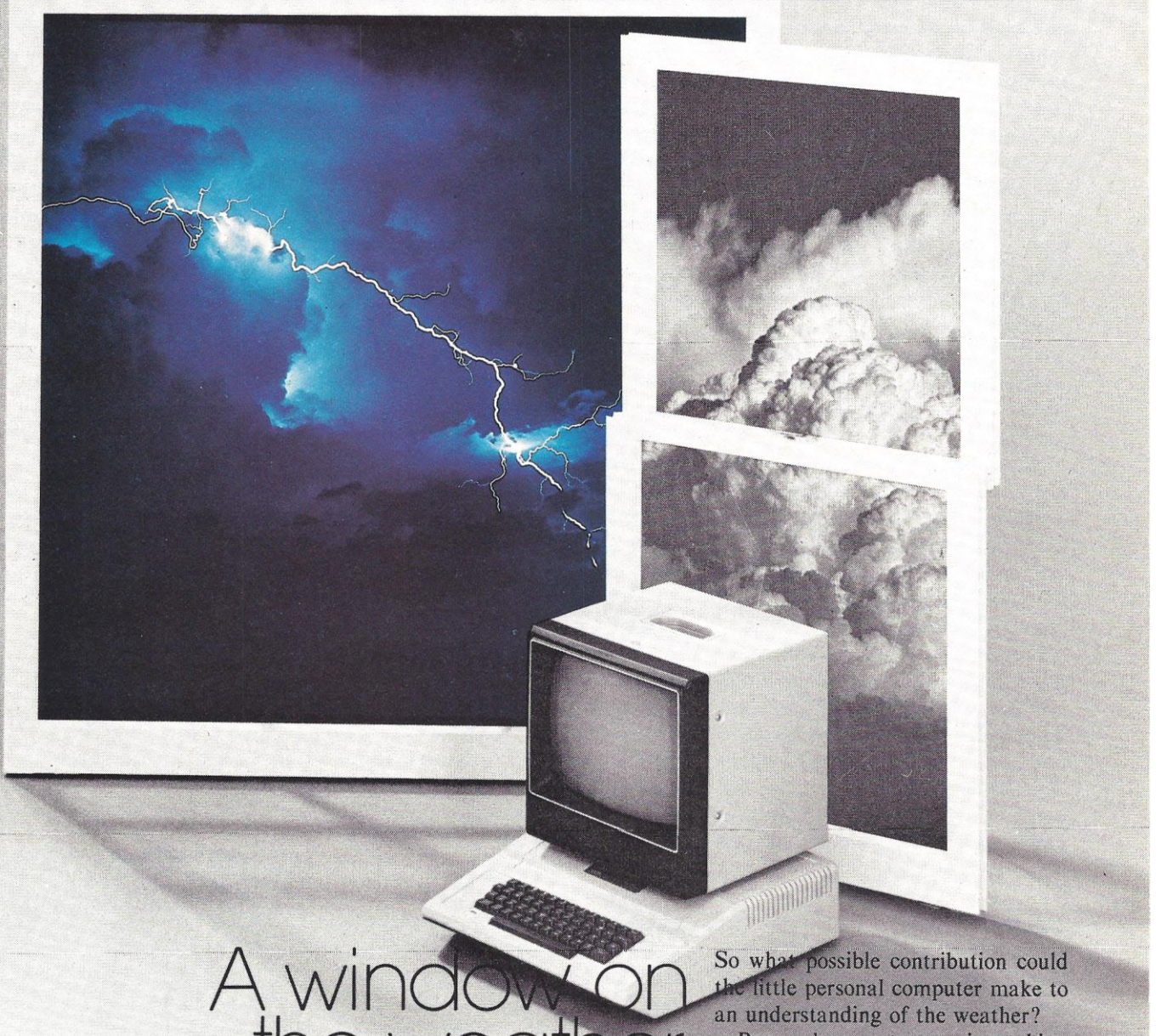


PHOTO BY FREDERIC LEWIS INC.

A window on the weather

Red sky at night, sailor's delight may still be true, but so is this: Personal computers are giving us "bread-and-butter meteorology"

Most meteorologists will concede that forecasting the weather past 48 hours entails little more than an educated guess. And, even with the help of the most sophisticated computers, these scientists can't hope to hit the mark every time. So what possible contribution could the little personal computer make to an understanding of the weather?

Personal computers are just taking on importance in certain areas of meteorology. They aren't being used to spew out predictions of whether or not the weekend will be sunny.

Weather forecasting involves "too much data for a small computer to handle," explains a forecaster at Weather Services Corp., a Bedford, Mass.-based weather-forecasting center that prides itself on its highly sophisticated, scientific, computerized forecasting prowess. Like most modern weather-forecasting operations, Weather Services relies on very large computers to handle the huge and still growing data stream

required for weather forecasting. "If anything, the trend is to go for even larger computers," he adds, noting that nobody he knows in meteorology is using small computers, personal or otherwise.

Instead, personal computers are being used to help with some of the most difficult issues facing our society: Air pollution, hazardous-waste contamination, food production and other critical issues are greatly affected by weather, and are being addressed in part with personal computers.

Decisions concerning these critical issues are often made using inadequate weather data. Personal computers are just now being applied to help with weather-influenced decisions, which, like conventional management decisions, are data-based.

Problems such as dispersal of air pollution, rainfall, water-table levels and those concerning energy issues require solutions based on accurate, timely and detailed meteorological data. Personal computers, by managing those data and processing them in useful ways, are beginning to make a major contribution.

The big picture

Just as importantly, personal computers are being used by the researchers who study broad weather patterns, to learn more about atmospheric conditions. Personal computers reduce and isolate weather events to aid in understanding. That knowledge is then applied to weather data to help in making informed decisions that ultimately affect all our lives. It is "bread-and-butter meteorology," says one researcher pioneering the use of personal computers in meteorology.

In this field, a personal computer can simply be used as a smart terminal. Clients of large computer-data-based weather-forecasting operations generally have a local data terminal, which they use to retrieve data from the large weather data stream and to tap into ongoing weather computations. A personal computer, acting as a smart terminal, can do everything a standard terminal does and more. How much more depends on research and software development that has only just begun. The American Meteorological Society has published little research on applying personal computers to weather studies. And at a recent national weather conference, only two papers were presented on applications for personal computers in the study of weather.

David Barber, assistant professor in the University of North Carolina's meteorology department at Raleigh, presented one of those papers. Barber asserts that "the small machines have significant applications in a number of [weather-related] areas."

Barber points to climatology as one area where personal computers are useful. Some climatologists, he reports, have been using the computers to track daily records of climatological conditions and produce monthly compilations. At least one climatology newsletter is produced that way. The computer, in this application, is mainly managing data.

Barber himself prefers to use the personal computer as a weather teaching tool. Using an Apple II with dual disk drives, graphics and a Paper Tiger printer, he is able to display daily weather patterns to his students. The data are displayed on the screen against the outline of a map of the local area. As weather conditions change, Barber can update the image on the screen and the class can see changes in actual weather patterns.

Barber, by switching weather variables, classes how weather conditions develop over different periods. While serious, detailed weather forecasting requires larger computers capable of handling much more detail, personal computers are perfect for Barber's small-scale use. He looks at only a small geographic area or examines only one aspect of the weather picture at a time.

"Personal computers let you quickly display data," notes Barber. "They provide moderate computational capability." Those aspects of the personal computer make it a valuable tool for data validation and quick verification as weather patterns develop.

Graphic capabilities are crucial to Barber's use of personal computers. The current limitations of the machines are in resolution of the graphics, storage capacity and speed of computation. "I can't plot multiple data on the screen," Barber complains. On his map, he may plot reports from several dozen weather stations, but if he tries to plot more than one piece of data—wind speed and temperature for example—the data overlap and are not usable.

Quick calculation

Barber would like to begin to use his personal computer in the computation of data not transmitted as part of the national weather data stream, but which can be calculated from those data. Dew point and rela-

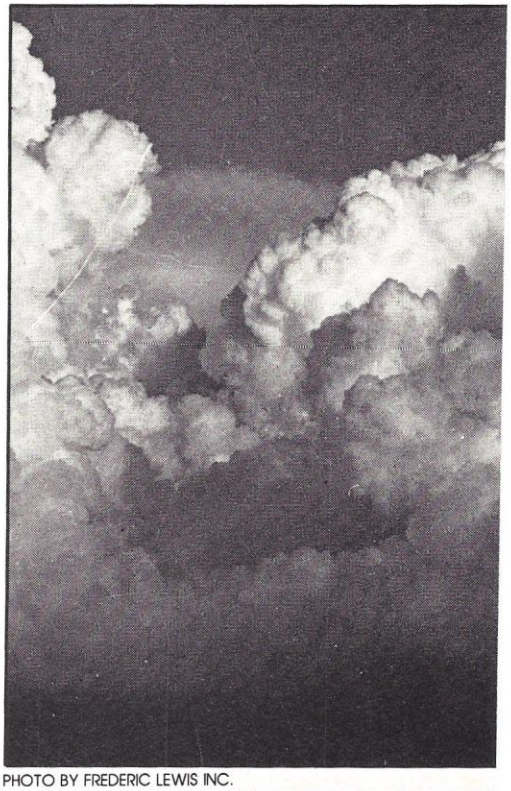


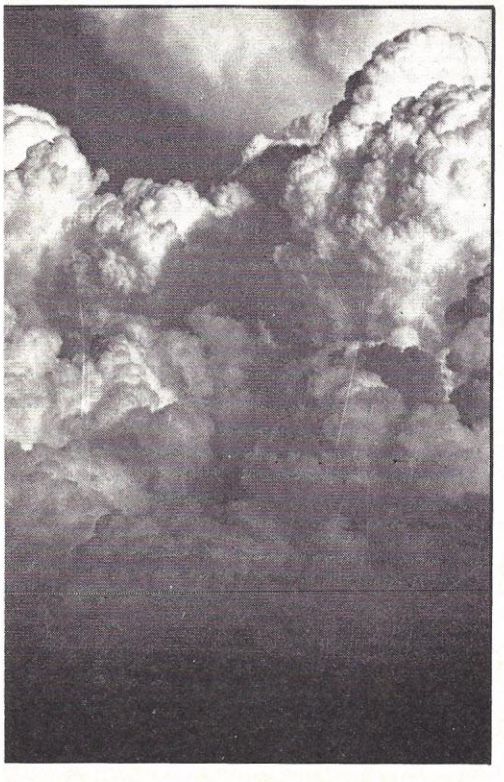
PHOTO BY FREDERIC LEWIS INC.

tive humidity are functions of observed data that can be calculated easily, he suggests, with a personal computer.

Barber would also like to develop his personal computers to calculate weather variables in a regular grid of points, rather than at the weather stations. What is happening at the nearest metropolitan airport is not necessarily what is happening in the local community.

In short, Barber wants his personal computers to emulate what the large computers are doing in weather forecasting, but on a smaller scale. This is part of what he calls "the second computer revolution," in which personal computers are used to allow human interaction with the data stream.

The large computer system that Barber would like his small computers to emulate is the MCIDAS program (Man Computer Interactive Data Access System). The program, first developed by the Space Science and Engineering Center at the University of Wisconsin, is now widely regarded in the world of weather forecasting. It allows large computers to receive signals from satellites constantly orbiting the earth and from conventional teletype data streams bringing weather information from around the country, explains Tom Whittaker, a computer and meteorology specialist at the University of Wisconsin.



People are "just scratching the surface" of what personal computers can do in meteorology, says Whittaker. He envisions some use of the small machines as terminals and as controllers of field and observation equipment. Whittaker also reports the increased use of small computers as teaching tools at the university.

"Personal computers can be highly selective in the data they extract," says Whittaker. Particular data, he says, can be taken out of the weather stream and analyzed using personal computers. The Apple computers used by the university's meteorology students haven't the speed or the memory for sophisticated modeling, but can be used to run program simulations of weather patterns.

The MCIDAS program, says Whittaker, can put data onto a grid in 15 seconds; his Apple takes more than an hour to do the same task. The huge amounts of data flowing into the MCIDAS program from all over the world would swamp a personal computer.

Whittaker says the smaller machines are more useful in teaching meteorology and in extracting small pieces of the available data. Without the small computers to control the printout of data, for instance, the school could be quickly buried in rolls of worldwide weather information and observations.

Personal computers are also being used to take weather information out of the data stream at the Massachusetts Institute of Technology. Researchers at MIT are using 16-bit personal computers mainly for their graphics capabilities, reports Robert Thayer, systems programmer for the MIT meteorology department.

MIT makes rigorous demands on the computer to get the kind of graphics necessary. One graphic image alone requires about 250k of memory for MIT's purposes, Thayer explains. That means that one double-density floppy disk would contain all the information for only a single graphic.

Thayer prefers 1024 x 1024 resolution, and the new IBM Personal Computer, with 900 x 900 resolution, comes close to meeting his needs. The very small personal computers, like the TRS-80 or the Commodore PET, he points out, offer about half of that.

Particularly effective, he says, are the larger computers based on the S-100 bus. If you want to do the kind of weather work that he is doing at MIT, Thayer recommends a minimum of 128k memory and 16-bit processing. With the hard disk drives that are becoming available for personal computers, Thayer sees the machines becoming even more useful.

MIT researchers take data off the satellite and teletype transmissions and plot that information in graphic form. Thayer, along with others at the school, develops programs starting with the video manufacturer's base and then develops subroutines. Eventually, he hopes his efforts will result in a substantial weather-graphics-program library at MIT.

The key

Graphics are the key to understanding weather, Thayer believes. You can work with a model for weeks but then "take one look at the graphic and know it's wrong," he says. Graphics vastly increase the ability to understand weather modeling by comparing real data and following sequential developments—both crucial to forecasting and understanding weather.

Pennsylvania State University, which has some of the most extensive uses of personal computers for weath-

er applications, considers graphics to be very important. "There is a lot of mapping" in weather study, notes John Cahir, associate dean and professor of meteorology.

At the recent national Weather Association conference, Cahir presented a paper based on his work with a minicomputer. "We're just beginning to think of the small personal computers for downloading data," he says. Students will use the personal computers first as smart terminals and then try to emulate the large computer.

It will be a long time, however, before the really small computers take hold, Cahir says, because of their limitations in graphics capabilities, a problem already acknowledged at MIT. Still, Cahir's colleagues at Penn State are rapidly moving ahead with development of personal computing for isolated weather study.

"I doubt that personal computers will ever be useful in weather forecasting," says Penn State meteorology professor Alistiar Fraser. "The machines are too small and too slow for conventional weather forecasting."

On the other hand, Fraser doesn't bother to apply the computer to the less important small weather applications, such as tracking snowfall or temperatures over a period of time. Those applications "are almost too trivial for a computer," he states. They can be done just as easily using a calculator.

Informal study

Fraser has his own HP-85 personal computer for small-scale modeling of isolated atmospheric events. Fraser might model something like the movement of a particular weather subsystem, such as the breakup of fog or the dispersal of pollution. (Dispersal of pollution was the subject of the only other research paper covering personal computers presented at the National Weather Association conference, Cahir recalls.)

Fraser develops his own programs by writing his own software and using commercial software such as VisiCalc. Each program is developed using standard weather-related differential equations.

Fraser may, for instance, study the ways sound travels through the atmosphere under different conditions. None of his programs ever gets to the stage where it is polished and ready for public distribution. "I use the computer as a research and teaching tool for weather studies," he says.

The personal computer "is a good tool," says Fraser. It does nothing that he couldn't do before, but without it, he might not have bothered to proceed with certain studies. Now he might "try things out on a whim that would have become too complicated before," says Fraser.

He also prefers the control he has with the personal computer. With the school's large computers, he must always stay in touch with what the programmers are doing.

Fraser's requirements for a good weather computer reflect the generally recognized emphasis on graphics. "Every dot must be addressable," says Fraser. Ninety percent of all the data is dumped out in graphics, he estimates.

John Dutton, head of the Penn State meteorology department also uses an HP-85 for teaching and research. His computer work entails

continued on page 90

The weather data stream

When professional media weathermen think about computers, they think about the largest available computers, and not about small personal computers. The reason, they explain, is the huge amount of data that makes up the weather "data stream."

The weather data stream describes the flow of weather-related information from all over the world. It is a non-stop flow of information from many sources through a variety of media. Weather satellites transmit voluminous, detailed weather information, and weather stations worldwide constantly transmit weather data via telex or telephone transmission lines.

Weather Services Corp., in Bedford Mass., is one of the largest private weather organizations in the country. Using four PDP-1134 computers, it receives continuous numeric weather information from the national weather service centers in Washington D.C. and Kansas City, as well from the World Meteorological Organization.

"Every six hours, weather stations around the world report in," says Weather Services operations manager Russ Christie. Almost every country in the world participates in making their weather data available, except for a few countries.

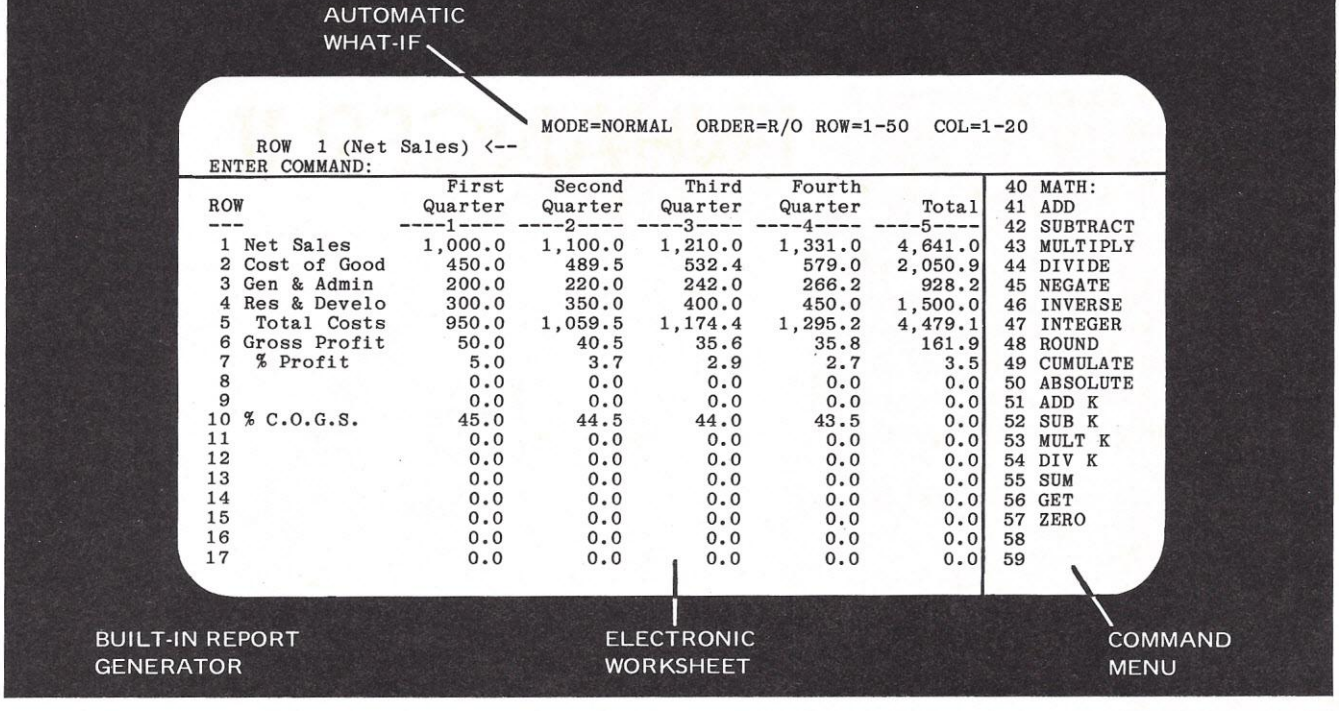
In addition, weather satellites provide visual weather data of the entire earth. "You must have a large computer to tap the satellite data," says Christie. At Weather Services, the weather data is stored and sorted so that it can be accessed by personal computers.

A personal computer can operate as a terminal of the large Weather Services computers and can retrieve a small portion of the total worldwide weather data that is being received. Using periods and dashes, simple graphics can also be achieved on a personal computer, and even better resolution is possible with some of the more sophisticated machines.

If the large computers at Bedford couldn't store and sort the weather data pouring in from worldwide sources, "you would end up continuously printing out a stream of data," states Christie. By combining the large computers with personal computers, people interested in weather can pull only the information they need from the weather data stream.

microplan™

the electronic worksheet for CP/M® users.



"The best piece of software . . . ever!"

The industry is buzzing with comments on MicroPlan. Users have supplied unqualified quotes "the best . . . ever."

ALTOS COMPUTERS agrees. The ALTOS budgeting manager uses MicroPlan for revenue forecasts, consolidations, and everyday analysis. DURANGO's Product Manager uses MicroPlan for product pricing and for developing marketing strategies. TOSHIBA's General Manager uses MicroPlan for developing marketing strategies. The DNYABYTE VP of Finance simply says, "it's dynamite!"

And, ADDS' system staff maintains budgets; TELEVIDEO's Controller reports financial performance; and NORTH STAR's Marketing Manager analyzes sales—*all in MicroPlan.*

MICROPLAN IS EASY TO USE. You don't type; so MicroPlan is designed for no typing ease. You don't think in formulas; so MicroPlan is designed for pushbutton ease. You are not a programmer; so MicroPlan eliminates all the computerese that makes life difficult.

MICROPLAN SOLVES PROBLEMS. MicroPlan lets you solve your problems electronically. You enter values into the electronic worksheet. MicroPlan handles all the sums, percentages and ratios. Even complex depreciation, loan analysis and present value computations are supplied—all with pushbutton ease. And when you change one number, MicroPlan automatically analyzes the impact of "what-if" questions.

MICROPLAN HAS POWER. MicroPlan has more features and solves more problems. Add-on modules allow you to do consolidations, automated variance analysis, statistical calculations—it even lets you build complex models. And, with MicroPlan solution books you can apply MicroPlan to *your* business, such as, real estate, tax planning, and sales forecasting.

Call on your dealers. Find out why people are saying "MicroPlan is the best . . . ever!"

MicroPlan is available exclusively through local dealers. For more information, contact: Chang Laboratories, 10228 North Stelling Road, Cupertino, CA 95014; (408) 725-8088.

CP/M is a Registered Trademark of Digital Research.

CIRCLE 96

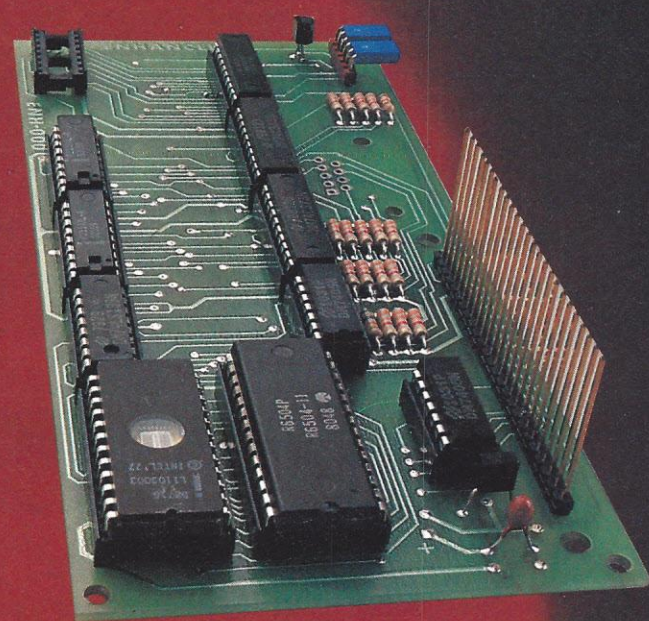
Videx INC.

897 N.W. Grant Ave. • Corvallis, Oregon 97330 • 503/758-0521

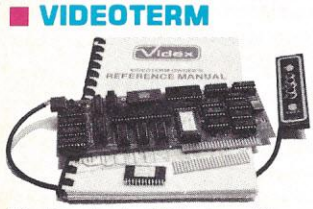
THE DAWN OF A NEW ERA FOR APPLE][®: THE ENHANCER][

Introducing the Enhancer][: a new Standard which is improving the relationship between Humans and Apples. The Enhancer][can help your Apple][‘s keyboard become more sociable by remembering words or phrases which can be entered into the Apple by the mere touch of a key. Life can become even easier because the Enhancer][can remember what you typed while your Apple was busy talking to your disc (or doing other things). Naturally, it knows the difference between upper and lower case letters and what shift keys are supposed to do. It even knows to auto repeat any key held down. The Enhancer][replaces the encoder board making installation simple.

Suggested retail price: $149.00.



■ VIDEOTERM

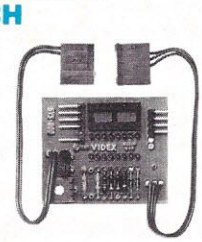


The time tested Videoterm 80 column card:

- 80 characters × 24 lines
- True decenders
- 7 × 9 character resolution
- Low power consumption
- Compatible with most word processors
- Softcard and CP/M compatible
- Modem compatible
- Most popular character set of any 80 column card
- Alternate character fonts available

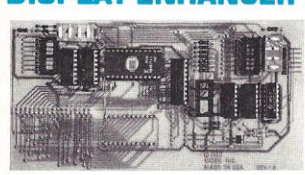
Suggested retail price $345.00

■ SOFT VIDEO SWITCH



The Soft Video Switch is an automatic version of the popular Switchplate. It knows whether it should display 40 or 80 columns or Apple graphics. It does the tedious work of switching video-out signals so you don’t have to. The Soft Video Switch can be controlled by software. Any Videoterm with Firmware 2.0 or greater may be used with the Soft Video Switch. The single wire shift mod is also supported. Package price is $35.00.

■ KEYBOARD AND DISPLAY ENHANCER



The original Keyboard and Display Enhancer is still available for Revision 0-6 Apples (on which the new Enhancer][will not fit). These Apples have memory select sockets at chip locations D1, E1 & F1. The Keyboard and Display Enhancer allows entry and display of upper & lower case letters with fully functional shift keys. It does NOT have user definable keys nor a type ahead buffer. The price is $129.00.

■ ACCESSORIES:

Videoterm Utilities Disc $37.00
(includes)

- Font Editor
- Pascal Mid-Res Graphics
- Applesoft Read Screen Utility
- Top & Bottom Scrolling
- Pascal Vidpatch
- Graphics Template

Character Set EPROMs $29.00 ea

- Half Intensity
- Inverse
- German
- Katakana (Japanese)
- Line Drawing Graphics (Expanded)
- Spanish
- French
- Math & Greek Symbols
- Super & Subscript

Dvorak EPROM (Enhancer) $29.00
Lower Case Chip $29.00

Apple and Apple II are registered trademarks of Apple Computer Inc.

Susan Foster

Technology shock is manageable

Any new experience that breaks from former practices and procedures can be initially frustrating. But this need not be the case

Editor's note: In the hectic course of modern life we often begin to function as though we were on automatic pilot, barely thinking about what we're doing.

Computing Considerations is a monthly feature that has been designed to keep you conscious-when-computing, to make you think about what you're doing and what is happening to you while you're doing it.

So in this article we went to the experts to find out what it is that is happening to you when you experience frustration-when-computing, and to offer you tips on how to avoid this frustration.

We welcome reader comments.

There's no question about it: The rise in use of personal computers can add great impetus to the antacid market. And although relief is just a swallow away, there are other, non-medicinal preventative measures we can take to reduce the frustration associated with computer usage.

And the frustration is there in many guises—in resistance to new technology, the initial interaction with the machines, in buying the computer, in knowing what to look for and what to do if it stops working. Did you do something wrong or did it? Will you break it? Did you break it?

Psychologists say that the frustration involved in computer usage is related to stress and resistance to change. When people are frustrated, they feel aggravated, helpless, anxious or negative. Most humans try to avoid situations in which they feel this way, and this avoidance reaction is normal and natural. In fact, it serves a self-protective function. Feelings of frustration can make us experience stress symptoms. So we defend ourselves by resisting situations in which we might be stressed.

How can we, as computer users, avoid this frustration? We must understand the need for the change and

the benefits that will be derived from it—not only for our companies but for ourselves as well—benefits in terms of better decision making, time savings, job security, keeping up with the times and knowing that we are on the cutting edge.

Human beings have a tendency to fill information gaps with their own fantasies and misconceptions. Those who are using personal computing must get information that reduces uncertainty and clears up misconceptions. These misconceptions can include, "We'll break the machine. It will put us out of a job. We aren't smart enough to learn a new language at this point in life. We'll lose information," and so on. We need to eliminate these misconceptions and get a clear idea of what the change involves.

Finally people have problems when they think that they are unable to implement a change. This frustration can be avoided by knowing in advance what skills and knowledge are needed, along with the required ongoing support, training and technical assistance. And, perhaps most importantly, *people need to allow an initial period of inefficiency to legitimize their learning time.*

Anyone engaging in personal computing should do an initial cost/benefit analysis. This will answer questions like, "Why should I engage in personal computing," and "Why should I put up with the attendant frustration?"

We must be convinced that we want to do this, and that it is not too difficult. It helps to have personal computing appear as familiar as possible—by using role models, for example. To know that John Jones is using personal computing and John Jones is just like me or to know that Company Y is personal-computerized, and Company Y is just like mine, make it seem more plausible for me to do it as well.

It is only when a new experience conflicts with former needs, beliefs and values that we run into trouble. So we need to understand what people need and value and believe.

Managers, beware

Managers in particular must realize that their people will shy away from computing if they perceive the change as too risky—a feeling that results from a threat to a person's ego. Managers must allow for face-saving. They must feel that mistakes are OK. They must understand that employees are not going to be perfect, but that they will be learning as they go along.

According to Dr. Evan Peelle, an organizational psychologist in Ann Arbor, Mich., frustration may set in if a person sees personal computing as a reduction in job status. "Computing is a job that has traditionally been in the realm of a person in a lower position, like a secretary or a clerical worker. But computing is in fact a high-status activity, and very much on the cutting edge. In many organizational instances, it is also very important to have the workers who will use the computer involved in the decision to get a computer, or given a say in the choice of computer. It is of utmost importance that people

Dr. Peelle: "Managers must become the success models for their workers."

Anadex Printer Distributors

NORTHWEST (Oregon, Washington, W. Idaho)
Sigma Distributing
Bellevue , WA (206) 454-6307

NORTHERN CALIFORNIA
Basic Electronic Distributors
Santa Clara, CA (408) 727-1800
Terminal Rentals
San Jose, CA (408) 292-9915
Byte Industries
Hayward, CA (415) 783-8272
Computerland
San Leandro, CA (415) 895-9363

SOUTHERN CALIFORNIA
Basic Electronic Distributors
Inglewood, CA (213) 673-4300;
San Diego, CA (714) 268-8000
Terminal Rentals
Tustin, CA (714) 832-2414

SOUTHWEST
(Texas, Oklahoma, Arkansas, W. Louisiana)
Barnhill Associates, Inc.
Richardson, TX (214) 231-2573;
Houston, TX (713) 688-9971; Austin, TX (512) 451-0217

ROCKY MOUNTAIN STATES (Colorado, Wyoming, Montana, Utah, E. Idaho, Arizona, New Mexico)
Barnhill Associates, Inc.
Englewood, CO (303) 779-3600;
Scottsdale, AZ (602) 947-7841;
Albuquerque, NM (505) 299-7658;
Murray, UT (801) 262-3000

MIDWEST (Illinois, Missouri, Kansas, Nebraska, N. Dakota, S. Dakota, Minnesota, Indiana, W. Kentucky Iowa, Wisconsin)
Tek-Aids, Inc.
Arlington Heights, IL (312) 870-7400
Comtel Corporation
Chicago, IL (312) 539-4838; St. Louis, MO (314) 428-5508;
Shawnee Mission, KS (913) 722-1030; Minneapolis, MN (612) 835-3060; Indianapolis, IN (317) 253-1681;
Cedar Rapids, IA (319) 377-9434;
Brookfield, WI (414) 786-1940

NORTHEAST (Connecticut, Vermont, Massachusetts, Maine, Rhode Island, New Hampshire)
Pat Jenks Associates
North Haven, CT (203) 239-6201;
Woburn, MA (617) 938-0488
Microamerica Distributors
Needham, MA (617) 449-4310

NEW YORK METROPOLITAN AREA
Logon, Inc.
Fort Lee, NJ (201) 224-6911 / (212) 594-8202

MID-ATLANTIC STATES (Maryland, Washington, DC, Virginia, W. Virginia, E. Pennsylvania, S. New Jersey)
Micro Distributors, Inc.
Rockville, MD (301) 468-6450
Plymouth Meeting, PA (215) 265-1600

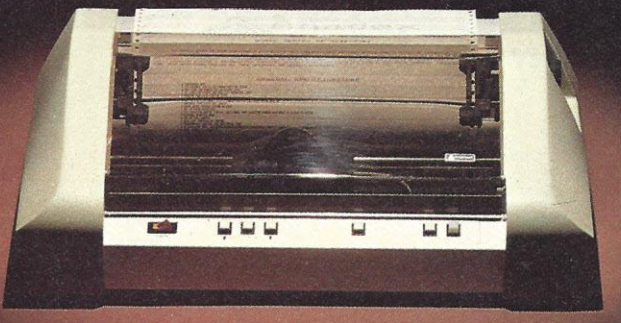
SOUTHEAST STATES (Louisiana, Florida, Alabama, Mississippi, Georgia, N. Carolina, S. Carolina)
Currie, Peak & Frazier, Inc.
Huntsville, AL (205) 536-1506;
Orlando, FLA (305) 855-0843;
Greensboro, NC (919) 273-3040

CANADA
Nelma Electronics Ltd.
Mississauga, Ont. (416) 624-0334

Anadex®
...the plus in printers

The important plus in matrix printers:

grafixPLUS.™



Since their introduction in mid-1980, the Anadex high-resolution DP-9500 Series matrix printers have set new standards for printer quality and performance. All models feature the rugged Anadex 9-wire print head that combines long life with resolutions of 72 dots/inch vertical and up to 75 dots/inch horizontal. With this kind of resolution, fineline graphics (under data source control) and razor sharp characters are pluses built into every printer.

Performance Plus

The full standard ASCII 96 character set, with descenders and underlining of all upper and lower case letters, is printed bi-directionally, with up to 5 crisp copies, at speeds up to 200 CPS. Models DP-9500 and DP-9501 offer 132/158/176 and 132/165/198/220 columns respectively. Print densities are switch- or data-source selectable from 10 to 16.7 characters/inch. All characters can be printed double-width under communications command.

Interface Plus

Standard in all models are the three ASCII compatible interfaces (Parallel, RS-232-C, and Current Loop). Also standard is a sophisticated communications interface to control Vertical Spacing, Form Length and Width, Skip-Over Perforation, Auto Line Feed, X-On/Off, and full point-to-point communications.

Features Plus

As standard, each model features forms width adjustment from 1.75 to 15.6 inches, shortest-distance sensing, full self-test, 700 character FIFO buffer (with an additional 2048 characters, optional), and a quick-change, 6 million character life ribbon.

Quality Plus

Beyond the built-in performance of the grafixPLUS series printers, the engineered-in quality and support are equally important. The result? Approval of both UL and FCC, Class A; operating noise levels under 65dbA; and a nationwide service organization second to none.

To see for yourself why the grafixPLUS printers offer more pluses for your printing dollar, contact us today.

Anadex®

the plus in printers

Made in U.S.A. for the World

ANADEX, INC. • 9825 DeSoto Avenue • Chatsworth, California 91311, U.S.A. • Telephone: (213) 998-8010 • TWX 910-494-2761
U.S. SALES OFFICES, San Jose, CA (408) 247-3933 • Irvine, CA (714) 557-0457 • Wakefield, MA (617) 245-9160 • Austin, TX (512) 327-5250
ANADEX, LTD. • Weaver House, Station Road • Hook, Basingstoke, Hants RG27 9JY, England • Tel: Hook (025672) 3401 • Telex: 858762 ANADEX G

CIRCLE 78

The efficient new servant comes home

Why waste those precious free moments with domestic chores, drudgery or concern for security?

Let us introduce a live-in domestic servant whose name is Fred. A genial sort who has become more or less a part of the furniture in a house in Arlington, Va., Fred is limited in his abilities and doesn't do windows or make beds. But what he does, he does tirelessly, reliably and without complaint, which is a good thing because the lord of the house has some tyrannical tendencies.

Each time his employer comes home and shouts out, "Fred, we're back," Fred cheerfully replies: "Glad to see you again, sir." Fred stands ready at all times to make the master's life easier by performing a lot of simple tasks, such as turning one light off and another on, switching the TV set on at the right time for the evening news and then switching it off when the boss asks him to start up the stereo instead. Fred brews morning coffee, wakes the boss up, and doesn't mind trying again 10 minutes later if the boss is too sleepy at first. Fred is used to being asked throughout the day to tell the time. True to his calling, he never speaks until spoken to, agrees with his boss's politics, and flatters the boss.

If you suspect by now that Fred is a talking computer with some remarkable abilities, instead of a rather humble human servant, you're right. Fred and his real-life creator and master, an electronics professional named Reuel Launey, have the kind of comfortable and effortless home life that has been portrayed in many science-fiction stories.

A computer that controls and monitors the apparatus of a home doesn't have to be able to talk as Fred does. But some people, like Reuel Launey, enjoy the vocal give-and-take to entering commands through a keyboard or remote keypad.

The possible applications and configurations of computerized home control are as diverse as homes themselves—in layout, the appliances present, degree of security needed, and the interest and skill of the residents in creating a system that meets their unique purposes.

Anyone with a strong aptitude for electronics (or with access to the expertise of others) can nearly achieve the security of a fireproof, intruder-proof fortress, plus the comfort of a house outfitted with a system that conducts much of the housekeeping. But even an average householder of no particular sophistication in electronics can put together a less complex system, also based on a personal computer, that will give a previously unknown degree of security and daily convenience.

In the beginning

The idea of using a personal computer for control in the home has a curious history, which is just beginning to come full circle. When the first computers that an individual could afford were introduced around 1976, it was widely expected that the control possibilities would provide the first entry to a mass market. Indeed, many, if not most, of the early buyers were electronically inclined tinkerers who enjoyed putting a computer through its paces to operate the toaster or the garage door. But the tinkering took more time and ability than most people could afford, and the hobby-oriented users hardly constituted a mass market.

Meanwhile, personal computers have found a rapidly growing market for video games, easier record-keeping and other financial functions, self-teaching, and a variety of

Ken McLamb

other useful and enjoyable applications in the home. Many users, especially those who have gotten over the novelty of games but have been pleased to discover how versatile a computer is, have explored new ways to get practical value from the computer. With a moderate amount of money and time, the homeowner can electronically connect his computer to all sorts of devices to make the house safer and more comfortable.

The house of Tom Jefferson in Burnsville, Minn., is a home-control showcase. Jefferson is a supervisor of quality in the Data Communications Network of Republic Airlines. Though he had no experience in programming, his work led to an interest in personal computing, and he bought an Apple II Plus for his home.

Not just a toy

Jefferson has three young sons, so it's not surprising that game cassettes provided the first use of the computer. But Jefferson was determined from the beginning that the computer wasn't to be a toy. He taught the boys some programming techniques, and he has a standing rule that before any games session, each child must spend at least a half-hour to devise a simple program—creating graphics or an arithmetic game, for example—and then demonstrate the program and explain how it was created.

With his own new programming ability, plus the requisite peripheral equipment and enhancements to his 64k Apple, Jefferson has devised a set of five programs that put an extraordinary degree of control over the house at his fingertips.

One program enables Jefferson or his wife to switch lights on and off in any room from any other room. The computer's real-time clock not only turns on certain lights at wake-up time, but also permits perpetual automatic on-and-off scheduling of lighting.

A second program commands appliances, such as the TV and stereo, and a toaster is also timed for the family's wake-up. Computer-monitored sensors, placed strategically in doors and windows, will sound an alarm if there is an intrusion, and if the family is away the computer will automatically phone in the alarm to the police. A third program also uses sensors, to monitor and control temperature, for savings on heating and air conditioning costs.

Those applications are straightforward enough, but Jefferson let his imagination run free in a program he simply calls "Moods." With a few keystrokes, Jefferson can create any of 10 home atmospheres by setting a combination of appliances into action or inaction.

For example, the program's mood 1 is the "Saturday Night Mood." The kids are in bed, and mom and dad are in the mood for a relaxed evening. The computer automatically dims the living room lights, and continually turns the TV on and off at preset times for the Jeffersons' favorite programs. It also turns the stereo on between TV programs. Alternatively, via a subroutine, the computer will prompt music for up to two hours from a sequence of cassette and reel-to-reel tapes.

Then there is the "Company Calling" mood. At the appointed time the computer will turn lights on or off in each room, turn the TV off and the stereo on, and start the coffee brewing. If the Jeffersons want to show slides, the computer, with another subroutine, will automatically lower a screen from the ceiling and

control the advance of slides.

And the fifth control program? Every visitor naturally wants to know how these electronic wonders came about. So Jefferson inserts his "demo" disk, and at either the TV set or one of Jefferson's two monitors, the guest can watch the computer introduce itself ("My name is Alpha.") and then give an easily understandable explanation of how a computer works and a show-and-tell demonstration of the home-control system.

Jefferson also subscribes to The Source to link his computer by telephone to a wide variety of current information, and the computer is used weekly by his wife to run the "marketing" program Jefferson wrote. By measuring kitchen-and-pantry inventory against the data that Mrs. Jefferson enters on recent consumption, the computer can literally print out a shopping list, along with the price of each item at the supermarket she uses most often. That program also helps to monitor the family budget, Jefferson says.

Spreading the word

Despite the elegance and seeming complexity of his set-up, Jefferson says the time and effort required have not been a burden; he spends about an hour a day at the computer mainly to update data and work on new programs.

"I've become an evangelist for personal computers," Jefferson says. "Our computer has been exceptionally beneficial to my family, and I think it's just a matter of time—five years or so—before almost every home will have computing power of some kind, either a personal computer at home or at least access to outside computers via a terminal."

Other than the imaginative home-brew software, Jefferson put his control system together standard with Apple peripherals, components such as the sensors, and plug-in relay modules for each controlled appliance, which are widely available and easily installed.

But the interface hardware makes the computer the boss of the switches. The BSR X-10 Controller (marketed by Radio Shack and Sears under their own names as well as by the maker, BSR) is the link that brings the whole system together. Together with an interface specific to almost any brand of personal computer, installing an X-10 would cost $100 at most and would enable the computer to command as many as 16 appliances. Optional extras in the BSR system include a timer, a manual remote keypad and a recently introduced responder that enables an away-from-home user to command the X-10 through the telephone.

An important plus of the X-10 system is that it does away with multiple trails of wires from appliances to the input/output ports of the computer. (It signals controlled devices through the installed house wiring.) That advantage was the "dynamic breakthrough" that first got Tom Jefferson interested in the possibilities of home control. He predicts that the popularity of control functions will grow quickly when more personal computer users become aware that it's no longer necessary to do a lot of wiring and experimenting to obtain a functioning system.

Knowing the rules

What are the guidelines to follow in planning a control set-up? Mark Lambert is well qualified to answer, having done this planning recently at two homes, before and after a move

from Los Angeles to Sanford, Fla. Further, he is a computer professional, formerly in R & D at Northrop Corp., and now a personal-computer applications specialist with Martin-Marietta Aerospace in Orlando. Further still, by virtue of being an inveterate bargain-hunter and self-confessed scrounger, he has had the ingenuity to piece together a home-control system, including the computer itself, for less than $1000.

The goals that should be common to all homes and all users, Lambert believes, are these:

- A system should be automatic, able to run indefinitely without requiring attention unless the operator wants to alter it.
- Its configuration and input parameters (date, time, temperature, sequencing, and so on) should be adaptable, and it should be flexible in the devices to which it can output. Manual overrides of automatic processes are highly desirable. Ease of use and "friendliness," such as user prompts, are important if the system is to be used by children or others less knowledgeable than the person setting up the system.

And the system *must* be reliably free of electronic glitches. "There's only one thing worse than an alarm system that gives false alarms," says Lambert. "That's an alarm that does nothing when the burglar comes in."

At his own new home, Lambert has computer control of lamps in three rooms, TV and stereo, an outside floodlight, and a security system connected to an alarm in the master bedroom. The basis of the "viable, stand-alone computer system" which he has painstakingly assembled is a Micro-DaSys single-board computer with a 6802-chip central-processing unit. It has 16k of random-access memory, and a custom-built input/output controller card. Lambert's rig uses cables connected to devices the old-fashioned way, an approach that he says has no cosmetic drawbacks if a homeowner (or, especially, a renter) can use moldings or carpet edges.

Lambert's system, in accordance with his universal design criteria, runs automatically by a clock that turns over at midnight. The changing seasons are no problem for the lights, because sensors tell the CPU about the rising and setting of the sun. The system is highly adaptable because inputs and outputs are interrelated by modifiable software rather than hardware pieces, which would have to be discarded or expanded according to changing needs.

> "Versatility of control functions is assured by the mere fact that they are guided by computer."

"Versatility of control functions is assured by the mere fact that they are guided by computer," Lambert says. "Any type of sensor or control device can be interfaced. Sensors are obtainable to measure almost anything: temperature, pressure, vibration, voltage—you name the parameter and a computer is the best if not the only way to measure, display, correlate and evaluate it."

Catching the fever

Not everyone could bring Lambert's professional expertise or Tom Jefferson's aptitude to the task. But Lambert believes that the do-it-all-yourself approach to configuration "shouldn't be difficult to implement for anyone with a fundamental knowledge of electronics," and even a near-novice can assemble a starter system with the help of the sophisticated, off-the-shelf devices now available.

But software is all-important for control as well as for other computer applications, and except for a few limited control programs supplied with peripheral boards dedicated to certain hardware systems, the typical home-computer user today would need programming ability commensurate with the complexity, or the simplicity, of a working control set-up.

But the computer business has been through this before with a lot of other applications: When hardware technology steps fast ahead of the software to fuel it, expert programmers emerge to close the gap for less expert users. That is on the horizon now for home-control applications, which brings us back to Reuel Launey and his diligent servant, Fred.

Launey was one of the original hobbyists to catch the computer bug, buying a computer in 1976 from the now defunct Digital Group company. That computer was Fred's ancestor; Fred himself is an assembled Heath H-89, which is the clone of the ready-to-work Zenith Z-89.

"I was interested in putting a computer in complete control of my home, as much as possible by voice control," says Launey. "Why should I get out of my easy chair to get to the keyboard, when I only have to say, 'Fred, turn on the light'? There's no need to be so darn serious about it, either. Once in a while, after I've been reading the front page of the newspaper, I say, 'Fred, what do you think about Haig's foreign policy?' Fred's reply is a long whistle and then a boom, when the bomb hits the ground."

Head of the house

Launey says he is about half way to his goal of putting Fred in charge of the house. Fred's tools include the BSR X-10 Controller, a real-time clock, stereo sound synthesizer, and, for when Launey isn't feeling loquacious, a remote hexadecimal keypad. Keying the numbers from 1 to 16, Launey has a subtle menu of orders

for Fred; for example, Fred can turn one or more lights on or off at the same time, or make one brighter and another dimmer.

Fred's vocabulary of 24 phrases is programmable, so if Launey ever changes his opinion of Haig's foreign policy, Fred won't argue. Launey plans ultimately to refine his programming to multiply Fred's potential vocabulary.

> "Our computer has been exceptionally beneficial to my family, and I think it's just a matter of time before almost every home will have computing power of some kind."

Launey is satisfied enough with his and Fred's experience that he has quit his job with the Department of the Navy and founded a company called Artra Inc. to market a peripheral-plus-software package giving extensive home-control functions to a compatible personal computer. At present, that includes only the Heath/Zenith 89 and extant Digital Group machines, but versions to run with most other models are in the works.

Much of the recent development in control systems has been done with an aim (which Launey says is almost reached) to provide a mature and slightly modified version that would enable quadriplegics to control their environments by voice. Control systems for the severely handicapped have been around for some years now, but are expensive when started from nothing and must be operated awkwardly by blowing into a mouth appliance.

Launey's system, which has attracted much interest from professionals in care of the handicapped, would likely be less than half the cost of available set-ups including the needed basic machine, and would permit the handicapped to have almost normal control of doors, appliances, the telephone and so on.

The Artra Housemaster package for Heath/Zenith-89 users, (cost is $299 in kit form, $399 assembled) includes a real-time 24-hour clock and calendar, voice-recognition firmware, two sound synthesizers, and an H/Z-89 interface for the BSR X-10, which is not included. Options are battery backup for the clock/calendar, dual RS-232 communications ports, and voice synthesis modules based either on phonemes (basic utterances) or on linear-predictive coding, by which the user, in effect, programs the computer to remember and recognize his own speech habits and inflections.

The voice-synthesis option is necessary to make the system respond with spoken phrases as well as to control the environment and to sound gongs and chimes; the user-spoken question, "What time is it?" elicits the appropriate spoken report: "It is now seven minutes after three o'clock." Without voice synthesis, the computer can still answer the spoken question, "What time is it?" by chiming out the hours and minutes.

What distinguishes Housemaster, other than conveniently combining several parts of the needed control apparatus, is the included diskette with 18 home-control programs. The master Voice/Time Control Program combines the voice recognition, clock, and home-control-interface functions of the Housemaster board, to control household devices by voice or keyboard, or automatically by date and time. It also calls up any subroutine in the computer's memory. The user is taught via the diskette how to devise his own programs.

Launey's path from home-control curiosity to personal satisfaction to full-time computer afficianado has been paralleled by Ted Benglen of Fort Collins, Colo. Benglen, coincidentally, has used similar tools: He first assembled the H-8 model from Heath two years ago and has added an H-8 and the H-89 personal computer. He and three employees now produce peripherals, including a BSR X-10 interface, a voice synthesizer with unlimited potential vocabulary, and a limited-vocabulary "digitalker" for other Heath/Zenith users. Benglen is also working toward a control-and-communications system to aid the handicapped—especially the blind.

Benglen, who had no electronics background but taught himself by reading and dropping in (announced and unannounced) on community-college classrooms, settled on home control as the first use for his assembled H-8. By no coincidence he had just moved from a high-crime city to rural Colorado, and the computer served as a double-safety.

After setting up an automatic security system, which he could foil himself if he came home earlier than the timer expected, he installed sensors to control heaters, vents, doors and other elements of the house that are usually mechanically activated, and he put the lights on automatic. He "played at the keyboard" to devise new applications with the X-10, such as opening and closing the drapes and venetian blinds. He began experimenting with voice synthesis after the electronic novelty wore off. He wanted to "humanize" his computers.

OKIDATA

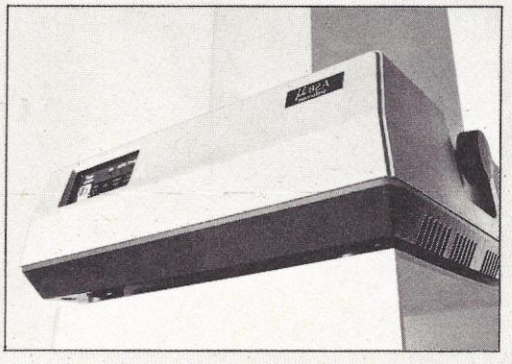
The Microlines:

A remarkable family of printers for people who want more printer for their investment.

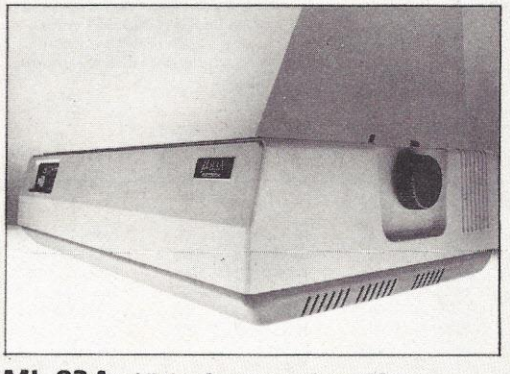
Stored-energy print head with a full year's guarantee. The full 96 ASCII character set. Block or dot-addressable graphics. A choice of print speeds, from 80 to 200 cps. In fact, all the full-featured performance of a big printer. At a small printer price. And the quality and reliability you have a right to demand.

Contact us at 111 Gaither Drive, Mt. Laurel, N.J. 08054 (609) 235-2600 for more information on the incomparable Microline family of fine printers. Also available through authorized Okidata distributors.

ML-80: Prints unidirectionally at 80 cps. Business-quality printing and reliability at a price attractive even for personal use.



ML-82A: Prints 80 columns bidirectionally at 120 cps, has 9-pin head for true descenders. Short line seeking logic increases throughput by 80 percent.



ML-83A: All the features of the 82A, including double-width and bold characters. The 136-column-wide carriage can handle paper up to 16 inches wide.

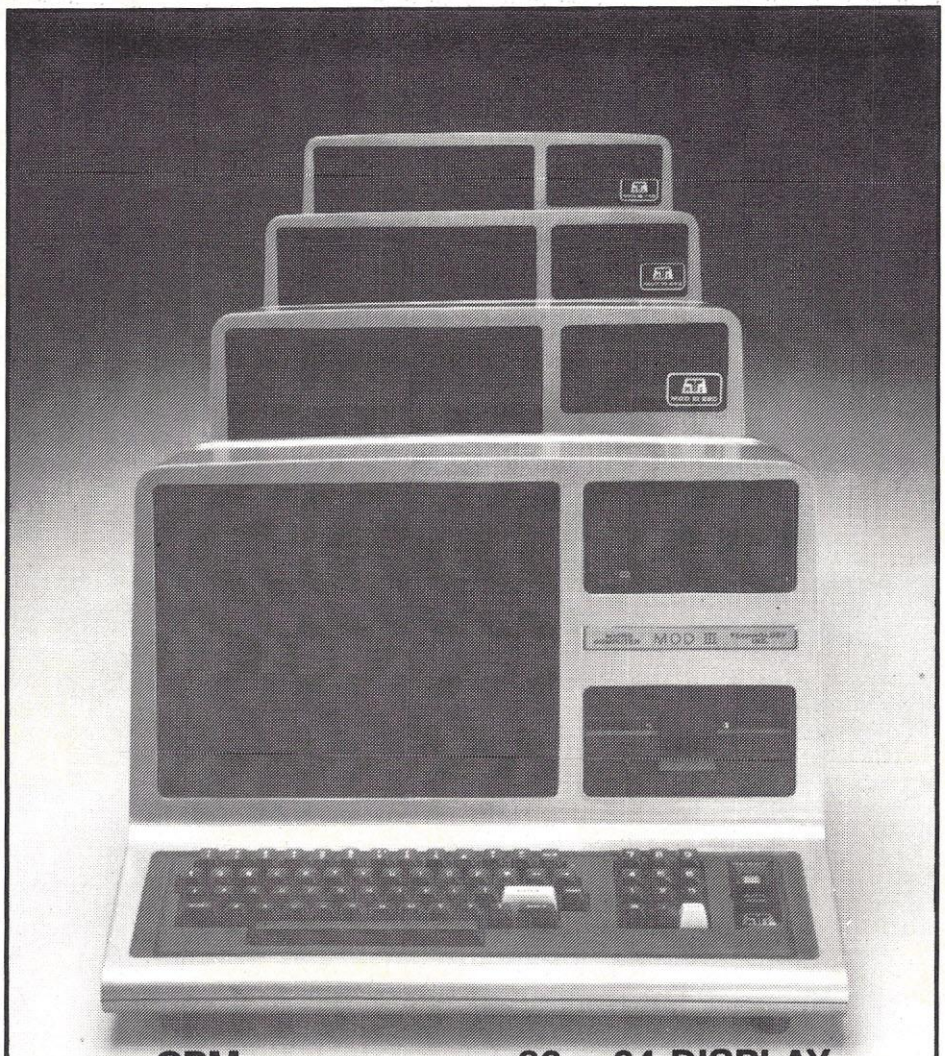
ML-84: Correspondence quality and data processing throughput. Prints bidirectionally at up to 200 cps, including charts, illustrations, forms, or dot-addressable graphics.

Making small printers for people who think big

Okidata is a subsidiary of Oki Electric Industry Company, Ltd.

CIRCLE 20

MEET THE MTI FAMILY OF LOW COST COMPUTERS



- IMMEDIATE AVAILABILITY
- CPM OPTION
- GREAT DISK STORAGE
- MODEL III COMPATIBILITY

- CPM
- WINCHESTER HARD DISK
- 80 x 24 DISPLAY
- 4 Mhz OPERATION

- 90 DAY WARRANTY
- LOCAL DEALER SERVICE
- 1 YR. EXT. WARANTEE AVAIL.

MOD III PLUS/140
We have taken the basic 16K Model III expanded the memory to 48K and added our MTI Double Density, Dual Disk Drive System. System is fully compatible with Radio Shack DOS and peripherals.

FROM $1998.

MOD III/240
Same as the MOD III PLUS/140 but has double storage capacity, and 2 dual headed 40 track drives.

$2449.

CP/M-80: Option to run CP/M 2.2. with 80x24 video board for word processing and many other applications.

$ 849.

MOD III/280
Has 1.5 megabytes of storage and utilizes 2 dual headed 80 track double density disk drives with DOS plus 3.3.

$2799.

4 Mhz Speed-up enhancement
Doubles the processor speed of the Mod III 140, 240, or 280 systems, when used with the DOS plus operating system.

$149.

MOD III/WINCHESTER
Our largest business computer system. 5.7 megabytes of storage. Includes a 5 megabyte Winchester hard disk drive and 80 track dual head disk drive used as back up and for conventional floppy disk operation.
$5399.

MTI AUTHORIZED SALES AND SERVICE CENTERS

Anchorage, AK	(907) 333-8322	Northridge, CA	(213) 886-9200	Mary Esther, FL	(904) 243-5793	Raleigh, NC	(919) 755-1175
Rogers, AR	(501) 636-9168	Pacheco, CA	(415) 689-2260	Panama City, FL	(904) 769-5887	Grand Forks, ND	(701) 772-7848
Mesa, AZ	(602) 833-8949	Port Hueneme, CA	(805) 985-2329	Tampa, FL	(813) 247-6023	West Milford, NJ	(201) 728-8080
Phoenix, AZ	(602) 244-9739	Redondo Beach, CA	(213) 370-5556	Norcross, GA	(404) 449-8982	Las Vegas, NV	(702) 870-4138
Sierra Vista, AZ	(602) 458-2479	Riverside, CA	(714) 781-6361	Blackfoot, ID	(208) 785-1497	Jericho, NY	(516) 333-2266
Tempe, AZ	(602) 831-5376	San Jose, CA	(408) 946-1265	Belleville, IL	(618) 277-2354	New Rochelle, NY	(914) 235-4444
Tucson, AZ	(602) 323-9391	San Diego, CA	(714) 275-4243	Collinsville, IL	(618) 345-5068	Syracore, NY	(315) 487-5000
Anaheim, CA	(714) 773-0240	Vallejo, CA	(707) 554-4933	Oak Park, IL	(312) 386-3323	Troy, NY	(518) 273-8411
Costa Mesa, CA	(714) 968-4076	Walnut, CA	(714) 594-9760	Shreveport, LA	(318) 865-7189	White Plains, NY	(914) 761-9283
Covina, CA	(213) 332-4088	Westlake Village, CA	(213) 706-0333	Shawnee, KS	(913) 631-2029	Portland, OR	(503) 668-8666
Goleta, CA	(805) 967-7628	Grand Junction, CO	(303) 434-3616	Minneapolis, MN	(612) 427-5783	Tulsa, OK	(918) 836-9503
Huntington Beach, CA	(714) 842-1348	Groton, CT	(203) 445-5166	Camerson, MO	(816) 632-6528	Dallas, TX	(214) 698-9995
Lancaster, CA	(805) 942-5747	Wilmington, DE	(302) 762-0227	Joplin, MO	(417) 782-0880	San Angelo, TX	(915) 658-3781
Montclair, CA	(714) 626-4813	Hollywood, FL	(303) 981-1011	Missoula, MT	(406) 549-9715	Cheyenne, WY	(307) 632-9132

MICROCOMPUTER TECHNOLOGY INC.
3304 W. MACARTHUR, SANTA ANA, CA 92704
(714) 979-9923 • TWX 910-595-1902 MTISNA

CIRCLE 21

Call or write for free brochure:
U.S. PRICES, F.O.B. SANTA ANA
CALIFORNIA AND MAY VARY BY AREA.
CP/M is a registered trademark of Digital Research, Inc

David James

SPECIAL REPORT

Understanding mass storage: what's in it for you?

Mass storage is more than memory. It's the way in which a computer transfers data from one source to another

Apple Computer recently told the world that it has a hard-disk unit. The $5\frac{1}{4}$ Profile is used with the Apple III.

Radio Shack's Winchester disk (an 8-inch unit) attached to the Model II.

Ever had that sinking feeling when you're writing your own program—and the video display flashes "disk full"? Ever spent valuable time swapping disks in trying to update a large mailing list, because you can't get all the names on one diskette? Or have you ever found you can't use certain games because you're short on RAM?

These predicaments illustrate one of the most frustrating—yet subtle—pitfalls of buying and using a personal computer: memory.

"Mass storage" is actually the appropriate term here, because we're really talking about the capacity of a computer to transfer data from one source to another. These sources can be in the computer's main memory, or they can be peripheral storage devices such as cassettes, floppy disks (or diskettes) or hard disks. To confuse matters even more, the term "Winchester drive" keeps cropping up in relation to memory capacity and storage technology. How can sense be made of all these competing media? And what criteria should be used to determine what's right for you?

There are essentially three "tiers" of memory storage, classified in terms of both the physical medium used and the storage capacity (the number of characters each medium can store). Logically, price is an indi-

cation of muscle. Cassettes, which are the first rung of the ladder, are lowest in price; floppies occupy the middle range, in terms of storage and price; and hard disks, including Winchesters, found in the penthouse of mass storage, are expensive, but sometimes absolutely essential for the health and well-being of your computer (and for your sanity).

Each of these three major groups involves trade-offs in terms of both price and performance; in every case, you give up something to get something. It becomes a matter of carefully deciding just what you want to do with your system and translating those general wishes into relatively finite numbers of characters and storage capacity needed. Then you are prepared to look for the medium that matches your applications context.

Cassette recorders, while low in cost, offer small-storage capacity and low speed.

But you should take more than your current needs into consideration. If you anticipate an expanded series of functions in the near future, then it may be wise to upgrade now. You may have to bite the bullet financially, but the grief you save could be well worth the trouble.

A bit of history

There is one other external mass-storage medium—reel-to-reel tape. The computer industry got its start in mass storage with tape reels and, just like the stereo industry, supplanted reel-to-reel recording techniques with less efficient, but far cheaper, cassette systems. Given the comparative inefficiency of punch cards, and the problems involved in storing all that paper, tape seemed like a logical alternative. A tremendous amount of information—millions of characters—could be put on a reel of tape. And, given optimum storage considerations, tape could last for a satisfactory period. Eventually tape loses its integrity, so backup copies were required every few years; but all in all, it was a workable system.

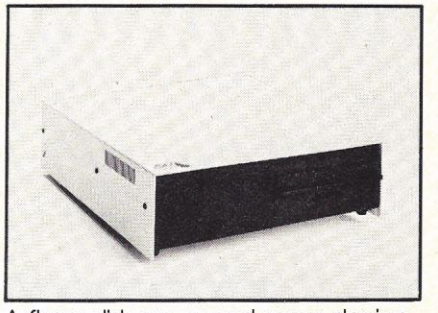
For the personal computer the cost of purchasing such tapes, let alone the cost of a tape-drive mechanism sophisticated enough to perform the searching tasks required by a computer (Ever try to find the beginning of a single song on a reel of audio tape?) made that system unwieldy. However, cassette technology—a low-cost and relatively reliable method of recording and reading stored data—was available, and quickly took the place of tape.

A cassette recorder to go with the built-in interface provided with the CPU was offered by systems manufacturers for around $30. Cassettes themselves, for both recording and playback of canned programs, were also made available at affordable prices.

But while the cassette was functioning as the medium of choice for the low end of the market, the floppy disk, or diskette, was making headway, primarily at the business end of the market. Given their relatively low cost, floppy disks represented an ideal alternative to reel tape for the business user. They were about as easy to use as a 45 rpm record. They didn't store as much as reel tape, but they were sufficient in most instances.

Starting out with an 8-inch format, diskettes, like everything else in computer technology, became better and smaller. A 5¼-inch version became the new standard and diskettes soon appeared that permitted reading and writing on both sides of the disk. This effectively doubled the capacity of the floppies, and made them even more desirable as a storage medium.

In the last year or so, hard-disk technology has entered not only the business sphere, but that of the personal computer as well. As software programming has become more complex, and the desire for multifunction computers has grown, computers with cassette- or diskette-storage systems have sometimes literally run out of headroom—they need more memory-storage capacity. Hard-disk systems can give them that capacity.



A fixed disk may need some device to copy the data for backup. It can be packaged with a floppy disk.

Hard disks, which are metal disks coated with the same kind of magnetic material found on tapes and diskettes, allow for a greater density in the storage of data—a kind of "crowding" together. Thus, for many business-computer users, and for personal and home use requiring a lot of storage capacity, the hard disk has become the medium of choice.

As a subset of the hard-disk universe, the Winchester drive mechanism is gaining favor. Originally developed by IBM for its business computers, the Winchester concept has also been scaled down. A Winchester drive can now provide significant memory for the personal-computer buyer—all he'll conceivably need—and without great expense. Remember, however, that you could easily spend more for a large-memory storage system than for the initial system.

DISK DRIVE BUYERS' GUIDE

Manufacturer	Product 1	2	3	4	5
Apple Computer 10260 Bandley Drive Cupertino, CA 95014 (408) 996-1010		●		●	
Commodore Business Machines 681 Moore Road King of Prussia, PA 19406 (215) 337-7100				●	
Corvus Systems 2029 O'Toole Ave. San Jose, CA 95131 (408) 946-7700,		●[6]			
Lobo Drives 935 Camino Del Sur Goleta, CA 93017 (805) 683-1576	●	●	●	●	
Micro Sci 17742 Irvine Blvd., Suite 205 Tustin, CA 92680 (714) 731-9461				●[7]	
Nestar Systems 430 Sherman Ave. Palo Alto, CA 94306 (415) 327-0125					●
Percom Data Company 211 N. Kirby Garland, TX 75042 (214) 272-3421				●	
Tandy Corporation 1300 One Tandy Center Fort Worth, TX 76102 (817) 390-3011	●		●	●	
Zenith Data Sustems 1000 Milwaukee Ave. Glenview, IL 60025 (312) 391-8192	●		●	●	

Notes:
1. Eight-inch Winchester disk drives.
2. Five-inch Winchester drives.
3. Eight-inch floppy-disk drives.
4. Five-inch floppy-disk drives.
5. Fourteen-inch Winchester drives and networking products for Apple.
6. Also networking software for various computers.
7. Double-density drives for Apple II.

While each succeeding storage medium has caught on as commercially viable, all three are still thriving today. Diskettes have not eliminated cassettes, nor does it appear that hard disks and Winchester drives will supplant floppies. Each storage medium has its own benefits—and drawbacks. Only by carefully fitting storage format and need can you make a wise decision.

Cassettes

Cassette tape operates in the low end of the price spectrum; it's not very likely you'll find a casette recorder used with a business system.

But that doesn't mean that cassette isn't right for you. Cassettes function perfectly well for a wide range of applications—and at a far lower cost than other technologies. For example, if you're intending to use your personal computer primarily for games and home education, cassettes are a very good choice.

A wide variety of recreational software is available for the most popular systems, at prices ranging from $19.95 to $29.95 in most cases. Most systems offer an optional cassette recorder and built-in interface for around $30—so you can be in business for under $100 to start, and then add programs incrementally without stretching your budget.

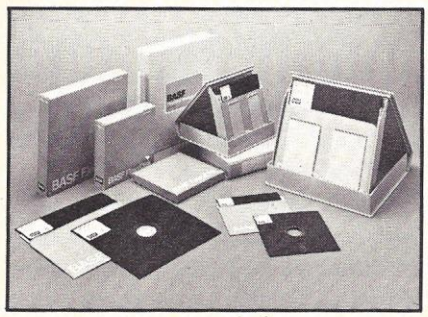
It's even possible to perform some programming on cassette, although you can very quickly run out of headroom if your program becomes too extensive. In general, cassettes are not intended for use as a recording medium; they perform best in playback. The reason? The data on a cassette tape must be addressed serially, just like on an audio cassette tape. You can jump back and forth, seeking differing points on the tape, but to do so continually is time-consuming and inefficient.

While it is possible to use the cassette as a recording medium for program generation or transfer of data,

it's really not practical if you're intending to use your system to generate data. If any single addressing operation involves 2000 or more bytes, you're probably better off with diskettes.

Diskettes

The floppy disk was also an outgrowth of the anti-punch-card movement generated by IBM. Unlike tape solutions (low-cost cassette or high-cost reel), the floppy disk has the benefit of random access at reasonably high speeds. Instead of searching back and forth to find desired information on tape, the digital controller, which addresses the floppy disk, "scans" the entire disk until the appropriate section is located.

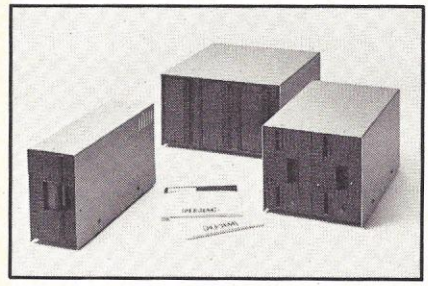


Floppy disks, in both 5 ¼-inch and 8-inch sizes, offer random access to the data, which means high speed.

All floppy disks consist of the same magnetic recording material found in the other media. They are enclosed in a plastic jacket to protect the disk; only a small read/write access notch is cut into the cover. Once inserted into the disk drive, the center of the floppy is gripped by the drive mechanism to permit the disk to spin.

The actual operation of the disk drive is fairly simple. The CPU issues specific instructions for locating data; the drive controller brings the read/write head into contact with the disk; and when the sought-after sector passes under the head, the controller picks up the data pulses and converts them into a format the computer (and you) can understand.

The data on any diskette are organized in concentric rings (like the individual songs on a record). Each ring or track is further broken down into sectors. When you address the disk, you're telling the read/write head to seek a particular track and sector—and you'll find your data there.



Users with dual disk drive can load their program disk in one, and use the other drive for recording data.

As is typical with growing industries, there are some basic incompatibilities—or at least differing opinions—in the specific formats and recording techniques. Therefore, you have to pay close attention to what these differences mean, because they affect the total quantity of data available for storage.

The first difference is that of size. The first IBM floppies were 8 inches in diameter. This was the de facto standard for floppy disks until five years ago when Shugart Associates introduced the first 4¼-inch floppy. The reasons? Lower cost and greater compactness for personal-computer systems.

Smaller can also be perfect for mass storage. With the move toward 5¼-inch floppies came the terms "density" and "double-sided." Density refers to the recording of more data around each "track" on the diskette—literally twice as many bits. Hence, the buzzword "double density." Double-sided refers to the ability to record and read data on both sides of the disk, simply by adding a second read/write head to the disk drive (and adding to the cost).

Therefore, the ultimate in disk capacity can be found in double-density, double-sided diskettes. Sound simple? Not quite so. Most disk drives cannot read both single-density and dual-density disks. If your disk drive is a single-density read-only mechanism, you'll have to buy the compatible disks. The same holds true for double-sided recording: The type of disk drive and controller mechanism selected will dictate the choice of media. You can't have it both ways.

What does it mean?

What does all this mean for you in terms of storage? A typical single-sided floppy will have about 80,000 bytes of storage capacity, or about 40 typewritten pages, for example. Adding double-sided disks and a dual disk drive will bring it into the range of 512,000 bytes, which is a lot of information-storage capacity.

You can look to even larger memory-storage systems—up to three million bytes of storage—if you opt for the 8-inch format. This kind of capacity is equal to that of a small-business computer, and is only needed if you plan to use your system in much the same manner.

The need for memory should be balanced against your budget. For example, a 5¼-inch disk-drive mechanism with a controller from Apple Computer will cost about $645. Using your Apple II, you can also go to an 8-inch disk drive from Lobo International, with 3.2 million bytes, for $1795—more than the cost of the CPU. It's just a matter of what you intend to do with the system. If you're running your own business functions on a personal computer, three megabytes or more of memory can easily be cost-justified. Entire files, such as mailing lists, can be easily maintained on the 8-inch diskette; there's far less chance of swapping the wrong disk or having to change disks in the

EXCITING NEWS FOR TRS-80™ MODEL III USERS!

Standard & Poor's unique software and data system—STOCKPAK—can help you manage your investments like a Wall Street Professional! Now for TRS-80 Model I and Model III users too!

STOCKPAK not only delivers a "stand-alone" Portfolio Management System but also gives you the software for Standard & Poor's monthly Common Stock Data Service (available to TRS-80 owners on a subscription basis). With STOCKPAK and the Data Service you command one of the most powerful and versatile investment tools available.

Here's How STOCKPAK Will Help You:

A 900 COMPANY DATA BASE SERVICE

Monthly Data Service subscribers receive a diskette containing 30 vital financial items on 900 of the most widely traded stocks (S&P "500" and 400 NYSE, ASE and OTC issues). Accompanying this monthly diskette is an Investor's Newsletter highlighting important financial news and investment strategies, with suggestions for maximizing the usefulness of the system.

STOCKPAK SELECTION SYSTEM

The heart of STOCKPAK is a powerful, analytical stock selection tool which enables investors to choose stocks which meet their investment criteria. For example, you may wish to select only those oil and gas stocks with price/earnings ratios of less than 7 and yields of 6% or more. Once a group of stocks has been selected, you can store it as a separate data file for continuing use.

REPORT WRITER

You can define the report formats you would like to see on those stocks meeting your investment objectives. Hundreds of calculations and ratios that you define can be sorted, averaged or totalled, and displayed on video screen or optional printer.

PORTFOLIO MANAGEMENT SYSTEM

Now you can effectively evaluate and manage your own stock portfolio of up to 100 securities with as many as 30 transactions for each. You can record "buy" and "sell" transactions, price and dividend information and stock splits for instant retrieval, for record keeping and tax purposes. You can measure actual performance or create hypothetical situations to help you make "buy" or "sell" decisions.

HOW TO ORDER STOCKPAK

STOCKPAK is designed exclusively for TRS-80 users with 32K business systems with two mini-disk drives. You can obtain the basic software and sample Data Base, plus a comprehensive User's Manual from your local Radio Shack Store for only $49.95. The STOCKPAK Monthly Data Updating Service can be ordered directly from Standard & Poor's for $200 annually, or from the order form provided in the basic package you purchase from Radio Shack.

Standard & Poor's Corporation
25 BROADWAY, NEW YORK, NY 10004 (212) 248-3993/3374

CIRCLE 22

middle of a program with the larger diskettes.

If your mailing list consists of Christmas-card reminders, and you don't intend to write the great American novel on your system, the 5¼-inch format is certainly more cost-effective. For no more than $700, you can have at least 140,000 bytes of memory with a single-drive, dual-sided system, which will do quite nicely for a broad range of text and data-processing applications.

Clearing confusion

The terms "hard" and "soft" sectored disks are also a source of confusion. Hard sectors are actually holes punched around the hub of the disk; inside the disk drive, a light beam shines on the disk, and when it passes through each hole, the sector is noted and marked.

The soft-sectored disks, currently becoming more widely used, involve a formatting process in which the computer writes a "header," basically a sector number, as well as the signals required for recognition when the read/write head is seeking specific data. Compatibility is the key; make sure the system can accept soft-sectored disks if you're planning to use them.

There are essentially three "tiers" of memory storage, classified in terms of both the physical medium used and the storage capacity.

However, the trend toward a dual-disk-drive format continues. The reason is flexibility. The dual drive permits one disk to be used as the operating disk, while the second drive can become a recording disk. Entire files can be saved from the operating disk, or from the CPU's own RAM.

This offloading of information can save you a lot of grief down the line. Power surges, power failures and other unexpected events can purge files and cause loss of data. It's just as traumatic for an individual computer user to lose data as it is for a large corporation. The dual-disk drive provides a flexible means of protecting yourself. You can record from your machine's RAM into a single disk drive, but the dual drive seems to be the standard for flexibility.

Again, there's a price to be paid. Commodore, for example, offers a dual-sided, dual-disk drive for $1795. Both manufacturers and peripheral vendors also offer a wide range of single- and dual-disk drives, but your ballpark price range should be $500 to $2000.

For the broad range of consumer computer use, diskettes have proven to be a reasonable compromise on cost and capacity. For less than $1000, the user can double or triple the on-board RAM of the system (the latter, while primarily serving as the operating memory for real-time use, can also serve as a temporary memory), and provide a means of external memory storage that saves vital information. If you've ever lost an important document, you know that the price can be well worth the peace of mind it buys.

But what about those of us who hunger for even more memory—those who need more storage for large files, or who need to access large amounts of previously stored information on a consistent, but random, basis?

A typical search on a diskette may take one or two seconds; it may take 20 seconds or so to offload an entire diskette. That isn't a long time to most computer users, but if you really live with your system, and it performs vital functions for business or personal management, then waiting that long for data can be frustrating, especially if your files are long and complicated. Floppies can also become scrambled electronically, and you can lose your data through no fault of your own. Hard disk is thus the medium of choice for those who just can't get enough memory.

Hard disk

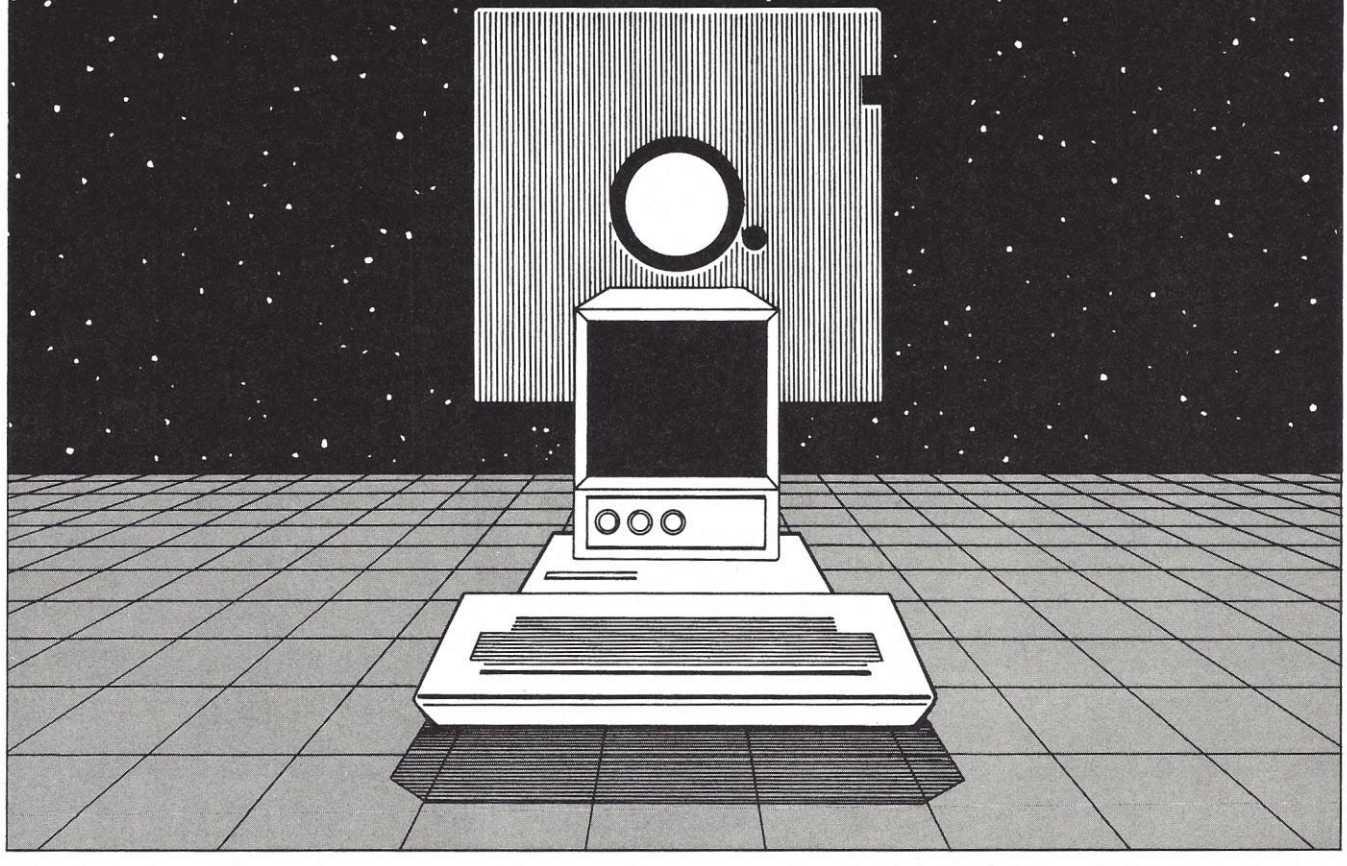
The "hard-disk" has the same recording substrate as floppies and tape, but it's contained on a metal disk. Initially, the hard disks measured 14 inches in diameter. This later shrank to 8 inches, and with the advent of Winchester technology, it soon dropped to 5¼ inches. The hard disk, as a generic mass-storage technique, offers users significant benefits in terms of storage capacity and access—but the bill is also higher.

For the typical personal-computer user, the hard disk is simply too expensive—anywhere from $5000 on up for the non-Winchester variety. Thus, the hard disk has primarily been the province of the large business-computer user—a company with multiple terminals and huge data files to be maintained. Imagine the chaos that would result if an employee in a firm of that size had to sort through hundreds of floppies to find a particular file; while possible, it's certainly not practical.

The hard disk offers users storage in massive quantities—5, 10, or 20 million bytes or more of information. It also provides faster access times—ranging from around 70 milliseconds to up to 800 milliseconds—than diskettes. Hard disks operate this quickly even in an environment in which

continued on page 74

Professional proofreading on the APPLE II Computer is now a reality



THE APPLE SPELLER fills the void that has consistently kept the large variety of excellent word processing packages for the Apple II Computer from approaching the power of a dedicated word processor. Finally, the first professional quality spelling verification program is available for the Apple II. The Apple Speller will certainly be the standard against which all other similar programs are compared.

The Apple Speller interfaces to the most popular Apple word processors including Applewriter, Apple Pie, Superscribe II, and Magic Window just to name a few. In fact, the Apple Speller can analyze the output of any editor that writes a standard Apple binary or text file to a diskette. In addition to this flexibility, the performance of the Apple Speller will astound the microcomputer world.

The Apple Speller is supplied with a 30,000 + word dictionary on a single 5¼" diskette with additional space to easily add another 8,000 words to suit your individual needs. The Apple Speller has built-in utilities to maintain the dictionary diskette. You can readily add words, delete words, and create an unlimited number of modified and/or new dictionaries for specific applications.

The Apple Speller is unbelievably fast. The first pass reads your document and collects all the words it contains at a rate of 5,000 words per minute. Next, the words are compared to the dictionary for spelling errors at the incredible speed of 50,000 words per minute. Finally, all misspelled words are marked as such in your document with a rate of 1,000 words per minute. This translates to proofreading a 10 page document in 1 minute if there are no spelling mistakes and 2 minutes, 15 seconds for an unlimited number of spelling errors.

Numerous options are provided throughout the program to enable you to completely control all activities of the Apple Speller. These include the ability to ignore both control codes and formatting commands, an alphabetical listing of either misspelled words or all the words in your document along with usage frequencies, multiple options for the action taken with each misspelled word, and much, much more! A verification mode is provided to allow you to examine and dispense with misspelled words while viewing them in the actual context in which they appeared in your file.

The Apple Speller requires an Apple II/Apple II + equipped with 48K, Dos 3.3, and two disk drives.

The Apple Speller is being introduced at the incredible price of **$75.00!**

SENSIBLE SOFTWARE
6619 Perham Drive Dept. PC
West Bloomfield, Michigan 48033
(313) 399-8877
Visa and Mastercard Welcome
Please add $1.25 postage and handling per diskette

CIRCLE 113

Hayes Stack™

Microcomputer Component Systems

At Hayes, we don't believe in second best. Or planned obsolescence. We believe in taking the state of the art to the limit. Our new Smartmodem, for example, is the most sophisticated 300-baud originate/answer modem you can buy. And yet, it is perhaps the easiest-to-use modem ever.

RS-232C Compatible. Smartmodem lets any RS-232C compatible computer or terminal communicate by phone with other computers and time-sharing systems located *anywhere in North America*. You get full and half-duplex operation with both Touch-Tone* *and* pulse dialing.

Auto-Answer/Dial/Repeat. Smartmodem can answer the phone, dial a number, receive and transmit data, and then hang up the phone – automatically! If desired, Smartmodem will even repeat the last command. You can depend on Smartmodem for completely unattended operation.

Completely Programmable. Smartmodem can be controlled using *any* programming language. Over 30 different commands can be written into your programs or entered directly from your keyboard.

Smartmodem also includes several switch-selectable features that let you tailor performance to your exact needs. You can "set it and forget it" for the ultimate in convenience.

Built-in Audio Monitor. Thanks to an internal speaker, you can actually listen to your connection being made. You'll know immediately if the line is busy or if you reached a wrong number – *and you don't even need a phone!*

Status at a Glance. Seven LED's indicate Smartmodem's current operating mode: auto-answer, carrier detect, off hook, receive data, send data, terminal ready and modem ready. You're never left in the dark!

Direct-Connect Design. Smartmodem is FCC registered for direct connection to any modular phone jack – there's no acoustic coupler to cause signal loss and distortion.

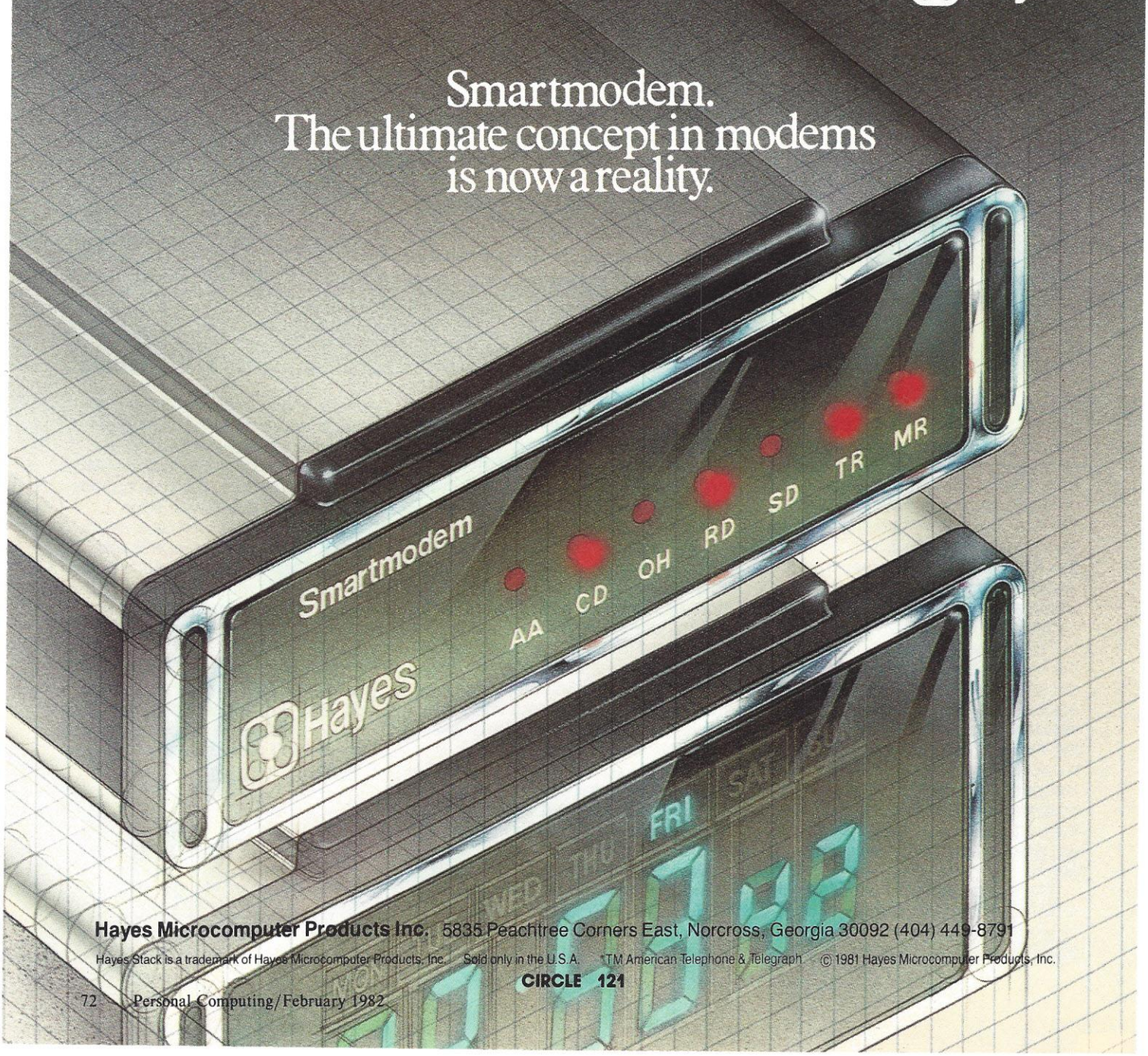
Smartmodem, Smart Buy. Professional quality features. Versatile performance. A full two-year limited warranty. A suggested retail price of only $279.

What more could you want? Perhaps the matching Hayes Stack Chronograph, an RS-232C compatible calendar/clock system.

Check out the Smartmodem wherever fine computer products are sold. And don't settle for anything less than Hayes.

Hayes

Smartmodem. The ultimate concept in modems is now a reality.



Hayes Microcomputer Products Inc. 5835 Peachtree Corners East, Norcross, Georgia 30092 (404) 449-8791

Hayes Stack is a trademark of Hayes Microcomputer Products, Inc. Sold only in the U.S.A. *TM American Telephone & Telegraph © 1981 Hayes Microcomputer Products, Inc.

CIRCLE 121

KNOWLEDGE IS POWER

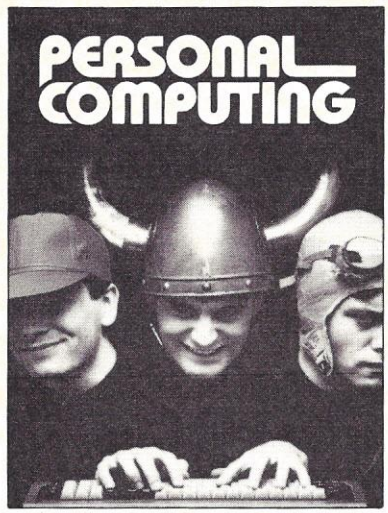
True when Sir Francis Bacon said it in 1597 at the dawn of the scientific age. And true a thousand times over in 1946, when the brilliant mathematician John Von Neumann supplied the key idea—the stored program—that made possible the modern computer.

Today the age of the microcomputer is upon us and individuals *personally* own machines vastly more powerful than Von Neumann's. Personal Computing, the hallmark of the 21st century. And for the readers of PERSONAL COMPUTING magazine, the 21st century has already begun.

Doctors, dentists, lawyers, retail merchants, parents, teachers, investors, inventors, salesmen, scientists, engineers, artists, designers, small businessmen, personal estate managers—PERSONAL COMPUTING subscribers all. Some started before they bought computers and then used our no-nonsense reviews and articles to decide whether and which for all their subsequent purchases. Others bought their computers first and then turned to us for the up-to-the-minute, accurate information they needed to get the most from their machines.

Profit, convenience, entertainment, education, our readers' interests run the gamut. But they share a common insight. They've discovered a tool that amplifies the power of their own minds. From us they expect—and get—articles to help them master and *use* that tool, articles like these:

- Are systems prices going to come tumbling down?
- The current balance sheet on small business software.



- Your data processing department manager's real opinion of your personal computer.
- Custom software is required—sometimes.
- Computer literacy—a right or a privilege?
- Inventory Control: One of the Toughest (But Most Useful) Jobs for a Personal Computer.
- Goodbye Passive T.V., Hello Active Learning.
- Self-writing programs can solve the software crisis.
- The ultimate fantasy— simulation games make it.
- Re-learning work habits to fit the executive work station.

Increase Your Power

Personal computing is growing with dizzying speed—over one million users now, over ten million by 1985. Ten million people with enormous power at their fingertips, but they won't all be equal. The ones getting the most from the computer revolution will be the ones who've subscribed to PERSONAL COMPUTING the longest. Don't delay. Don't miss out. The future won't wait. Call or send for your no-risk trial subscription today!

PERSONAL POWER

YES, enter my subscription to PERSONAL COMPUTING at the special introductory rate of $9.97 for 12 issues – a discount of over 44% off the regular price. I understand I reserve the right to cancel my subscription any time, for any reason, and receive a refund for the *full* amount I've paid.

☐ Payment Enclosed ☐ Bill Me Later

Charge my ☐ MasterCard ☐ VISA ☐ American Express

Account Number _____

Card Expiration Date _____

MasterCard Number _____
(4 digits above name)

Name _____

Address _____

City _____

State _____ Zip _____

Your first issue will arrive in 6-8 weeks.

PERSONAL COMPUTING, 4 DISK DRIVE, BOX 1408, RIVERTON, N.J. 08077

2316

Mass storage

continued from page 70

several users are accessing data on the same disk. But why all the interest in the hard disk if it costs so much?

Enter IBM, as it so often does in the computer industry. For all the speed and flash of the hard-disk concept, there are drawbacks. The read/write heads of the hard-disk mechanism fly over the disk material much more closely than they do in the case of floppy disks — and at higher speeds. The minimal clearances involved can mean that even the slightest particle of dust in the drive mechanism may one day find its way between the head and disk surface, causing the head to scratch the disk. This phenomenon, in the parlance of the larger systems world, is called "crashing a disk," and occasionally the disk does indeed break. In the process you'll lose all your data.

That's why IBM went back to the drawing board to develop a hermetically sealed enclosure that contained all the necessary ingredients for hard-disk storage. The result was a two-drive unit with 30 megabytes of memory on each drive. Winchester was the code name given the device by IBM.

Once you've waded through the mire of technical details and have found what you really need, you can then begin to make an intelligent assessment for a mass-storage-device purchase.

Cost effectiveness

For reasons of design and production, the cost of Winchester drives, compared to standard hard disks, is substantially lower. While the Winchester also started in the 14-inch format, it quickly migrated to 8 inches, where it became very cost-effective for the serious business user.

The Winchesters have been further downgraded into the 5¼-inch format, compatible with their floppy drive counterparts, but adding anywhere from five to 10 million bytes of memory capacity. While prices are still a little steep (about $3500 or so for five million bytes of memory), the Winchester is still lower-priced than other hard disks.

The operating advantages of a hard-disk system are obvious: Transactions such as merging or updating lists can be very quickly accomplished, and a raft of documents or data can be stored on the Winchester, with virtually no chance of failure or loss of memory.

The rush toward the hard-disk—specifically the Winchester—concept has involved both manufacturers and peripherals vendors. Firms such as Apple and Zenith offer Winchester hard disks as upgrade options; firms such as Lobo, Corvus and Percom offer after-market hard disks for Apple and Radio Shack systems, as well as many S-100 computers. The fact that the majority of these products have been announced in the last few months indicates how quickly the hard-disk concept has caught on.

Corvus, for example, offers a 5¼-inch Winchester for the Apple III in three memory capacities—5 megabyte ($3750), 10 megabyte ($5350), and 20 megabyte ($6450). Lobo International offers a combination Winchester and floppy unit for the Apple, with 6.4 megabytes for $3500.

At the same time, both Radio Shack and Apple have announced hard disks for their computers. The Apple Profile is a 5-megabyte, 5¼-inch Winchester, and is currently offered with the Apple III. It will be offered in conjunction with the Apple II in 1982. It costs $3499.

Radio Shack offers an 8-inch Winchester with 8.4 megabytes of storage capacity for $4495. The drive works with the TRS-80 Model II.

On the surface the concept of a Winchester—or any hard disk, for that matter—seems relatively clear. For a higher price, you get a significant increase in memory capacity, which is vital for complex transactions.

There is also the question of backup memory. While the Winchester concept largely eliminates the potential for disaster with hard-disk systems, the possibility exists that something will go wrong with the disk, and you'll lose your data. More commonly, even with five or 10 million bytes of information, you'll eventually run out of space if you record every piece of data you generate.

The Winchester is a sealed enclosure, so you can't swap a disk to gain more memory. You either buy a new Winchester, which is hardly practical, or you look for a backup mechanism by which you can offload files for storage, and keep the Winchester up and running for operating memory.

Recording tape

For larger computer systems, tape recording systems have proven to be very cost-effective, because the data

continued on page 142

Blue Ribbon Computer Books

Small Computers for the Small Businessman

Nicholas Rosa and Sharon Rosa

"Must reading for businessmen who are considering a purchase now or in the future."
—*West Coast Review of Books*

If you've ever considered a computer for your business but didn't know where to turn, this is the book that will arm you with all the information you'll need to make an intelligent, cost-effective decision.

ISBN 0-918398-31-2 $16.95

Instant BASIC

Jerald Brown

"In short, this book is a winner."
—*Kilobaud*

Here is an active participation workbook designed to use on your home computer. It's an easy, painless way to learn BASIC.

ISBN 0-918398-21-5 $12.95

Computers for Everybody

Jerry Willis and Merl Miller

"The wide range of basic material covered, plus a chapter that evaluates current computers on the market, makes this an attractive guide..."
—*booklist*

This fun-to-read book covers all the things you should know about computers. If you're anxious to buy one, use one or just want to find out about them, read this book first.

ISBN 0-918398-49-5 $5.95

Peanut Butter and Jelly Guide to Computers

Jerry Willis

Chosen by the Library Journal as the most note-worthy computer book of 1979.

"Should interest a wide range of readers seeking an understandable work on computers." —*Library Journal*

This entertaining book is a simple, easy-to-digest source of information on personal computing. It leads you through all the essential knowledge you need to get started.

ISBN 0-918398-13-4 $9.95

From dilithium Press

Please send me the following books: ☐ Small Computers for the Small Businessman ☐ Computers for Everybody ☐ Instant Basic ☐ Peanut Butter and Jelly Guide to Computers. I understand that if I am not happy I may return the book(s) within 15 days for full refund.

☐ Enclosed please find my check in the amount of $_____, plus $1 for postage and handling.

☐ Please send me your catalog of books.

Name _____

Address _____

City, State, Zip _____

dilithium Press
P.O. Box 606
Beaverton, OR 97075
(800) 547-1842

CIRCLE 24

Elli Holman

Educational pilot program: every child with a PET

The secret of the computer is that kids just don't want it to tell them that they're wrong. They don't care if their teacher tells them—they are used to that. But they will sit there in front of that computer and just knock themselves out to get the correct answer so the computer won't tell them to try again."

So says Gloria Stein, a fifth-grade teacher at Lawton Elementary School in Ann Arbor, Mich., who has just completed a two-year pilot program involving personal computers. Stein's school was one of two elementary schools in Ann Arbor that tested PET personal computers in all disciplines and at all grade levels.

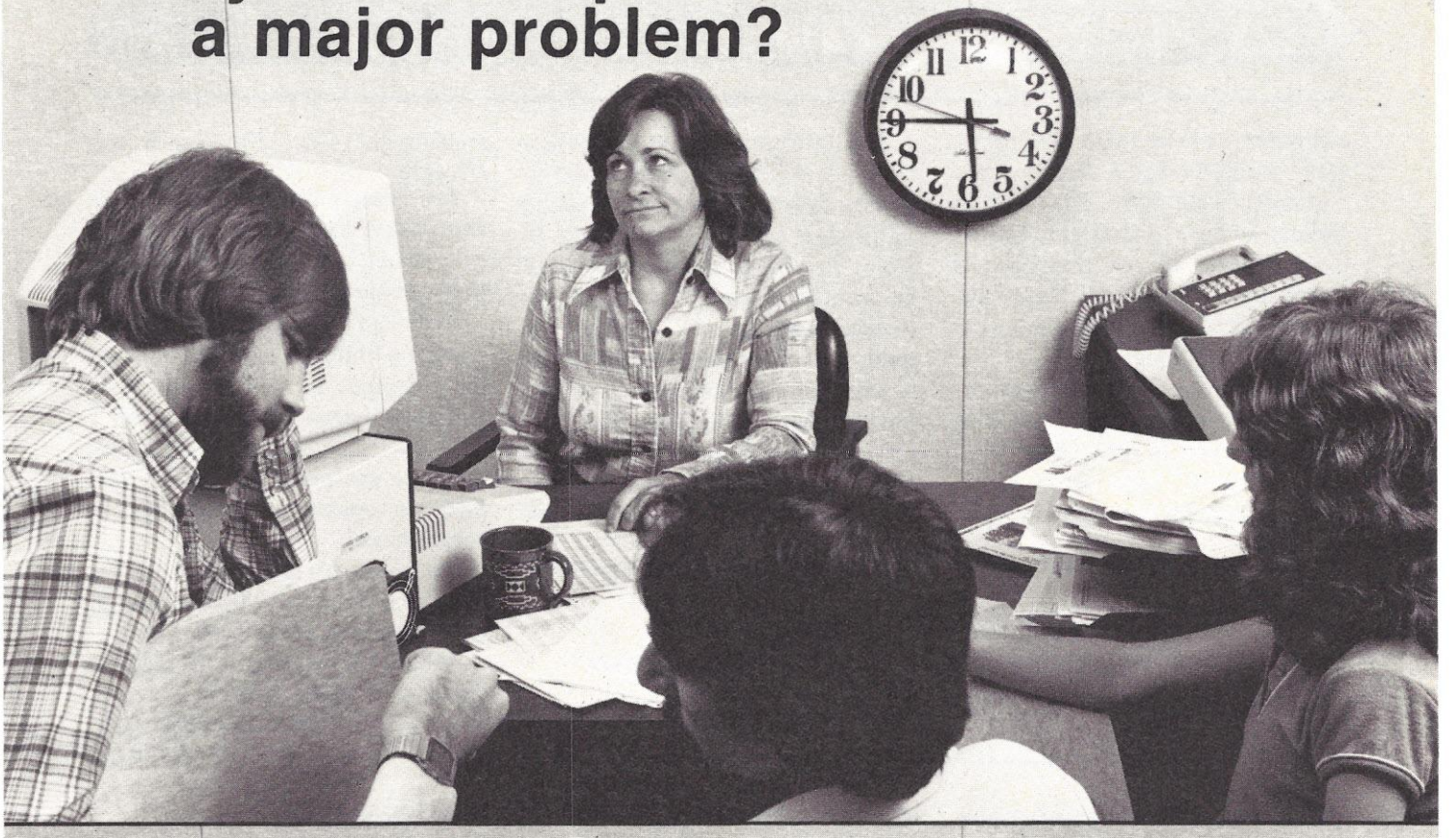
"It really has been an incredible experience for me to watch because my whole thrust was to try to find a place where the computer doesn't work," Stein says. "I'd think it wouldn't work with the kindergarten students, and then I'd go in with them and hook the computer up to a big monitor so I could deal with the whole class at the same time. Those youngsters were amazing. They experienced no trouble, no hesitation and no fear They were groping around, finding their own keys on the keyboard and remembering to return.

"You literally have to peel the kids away from the computer," Stein says. "They take to it like ducks to water."

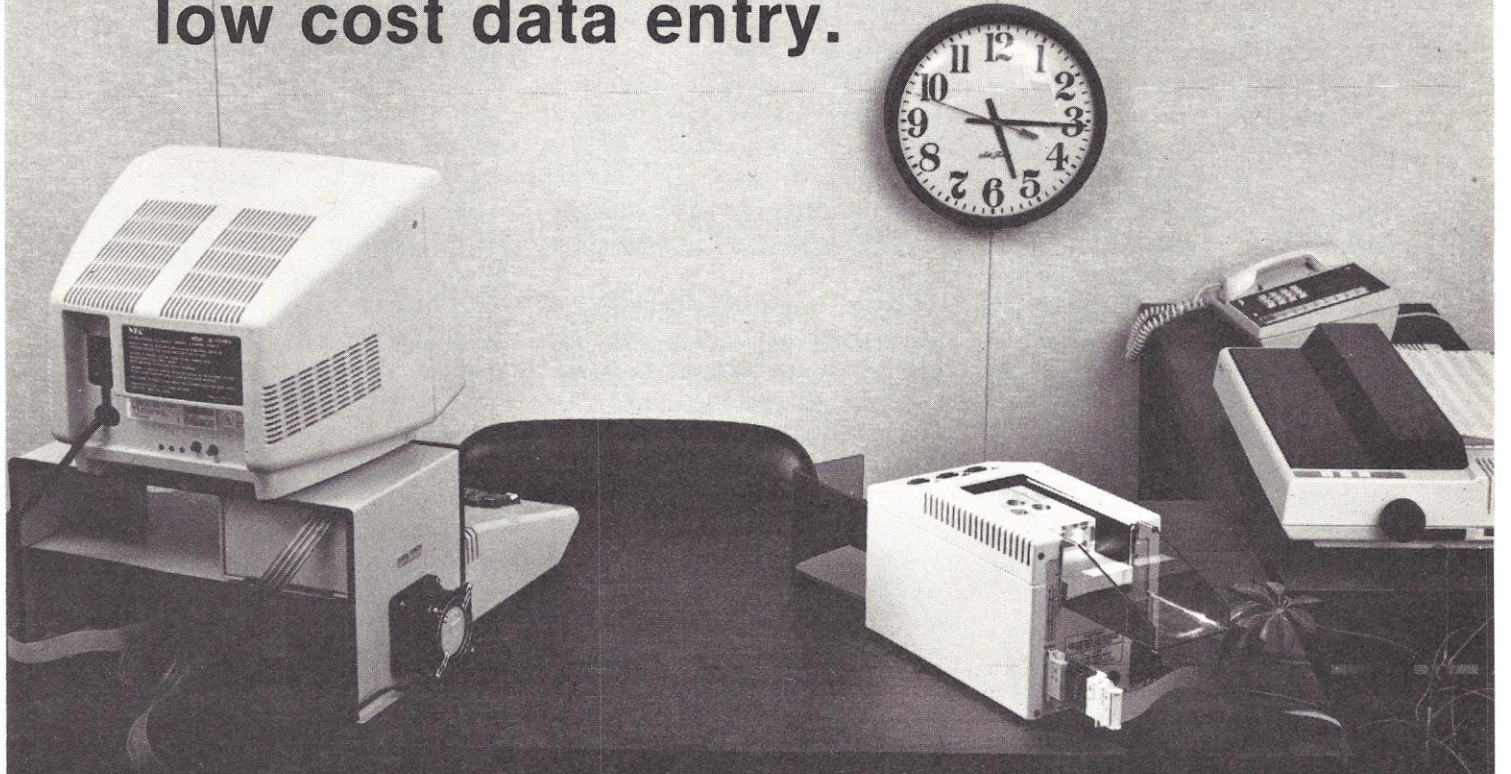
Three PET personal computers were purchased from Commodore for the pilot program at Lawton. Each computer was scheduled for one or two sessions per week.

"The teachers felt that they were almost obliged to see that when the

Has your microprocessor become a major problem?



Mountain Computer introduces—rapid, low cost data entry.



Mountain™ Computer
INCORPORATED

300 El Pueblo, Scotts Valley, CA 95066
TWX: 910 598-4504 (408)438-6650

Model 1100A Intelligent Card Reader

Ideal applications include time reporting, job costing, inventory control, market surveys etc. . . .

Contact us or see your computer dealer today!

CIRCLE 2

computer was in their classroom, every youngster had a turn to use it that day," Stein says. "For 25 or 30 children to have an adequate turn at the computer in one afternoon is pretty impossible. So all these frustrations came up for both the teachers and the children.

"There's just no question that if the computers are to be used as learning tools, you have to have them when you need them," Stein says.

She illustrates her point by comparing the computer to an encyclopedia. "If you have just one little time slot its almost like saying, 'Today each student must spend 10 minutes with the B book of the encyclopedia.' No teacher would ever do that."

Over a period of two years, the pilot program had changed the school administration's feelings. The computers are now concentrated at the fourth- and fifth-grade levels where teachers have at least one PET at their disposal at all times. There are also three computers in the school's library that can be loaned to teachers for classroom use, or can be used by students for independent work.

The PET serves the purposes of Stein's school. "I like the fact that it is all one unit and that it is easy to transport," she says. "I also like its cosmetic look. It's a neat looking unit and it does the job."

Making it work

The motivation the computer inspires in the children makes it a natural tool for remedial work. The teachers at Lawton Elementary have witnessed increasing success in helping children overcome difficulty with certain concepts.

One interesting test application came out of one of the school's programs, called English as a Second Language (ESL). According to Stein, Lawton is "a small version of the United Nations." Some of the students who attend the school are children of students at the University of Michigan in Ann Arbor. Consequently, some youngsters arrive each year not speaking any English—not even knowing a common alphabet.

The ESL teacher at Lawton wanted to use the computer with her students. Simple drill-and-practice programs containing graphics were developed by Stein with specific tasks for each child, and have achieved very successful results.

Children in the ESL program use the computer in the school's library after their English lessons. This does not take away from the time the teacher spends with the children, but reinforces what they learn during the lessons.

Another successful application of the computer has been introduced to Lawton's music department, using a program that has no sound. The teacher connects the computer to the large monitor and teaches her students to read notes, signatures and intervals between notes.

Stein has also written programs on electricity and magnetism for science units. She is currently using them with her fifth-grade class.

"The trick is to give the children the material they need," Stein says. "It's very helpful if the teacher knows enough about programming to create a program for the specific needs of a child. Once you have the program you can get in there and keep upgrading the data. The key is the software."

The natural curiosity of the children makes it imperative for Stein to be prepared at any time for that nagging question, "How does it work?"

"You can't get out of it," she says. "About a third of the class will use the computer for about two weeks and then start asking, 'What do I have to do to get it to do this?' Whether you plan on it or not, you end up teaching them basic programming."

Stein says her approach to teaching with computers involves a concept called "coming in the back door."

"Instead of saying, 'I'm going to teach you something that I want you to know,' I wait for the student to say, 'I need this information,'" says Stein.

> **"There's a tremendous amount of parental pressure aimed at getting these computers into the schools."**

Parental pressure

Where did the idea of putting computers in the schools come from? "There's a tremendous amount of parental pressure aimed at getting these computers into the schools. Administrators and school boards everywhere pay attention to the parents," Stein says.

During the pilot program in Ann Arbor, only two elementary schools were scheduled to have computers. However, parent-teacher organizations in some other schools wanted computers for use in their schools. Therefore, many schools in the system received computers because the parents went out and bought them.

"It's a groundswell that I don't think anybody is going to stop," Stein says. The future of the computer in the classroom is just beginning.

"I was asked when the secondary schools could be prepared for computer-literate children," she says. "My response was, 'You had better be prepared next September. Computer-literate youngsters are out there now and if they are not getting computer knowledge in the school, they are getting it in some other place.'"

The most important feature of a small computer?

It's who you buy it from. Because you don't just buy a computer—you buy a package. And it has to include a source for service, software, accessories, and expertise for as long as you own your computer.

That's why it's important to choose a store you know will be around that long. With a staff of professional computer experts. With the widest possible selection of computers, programs, and add-ons. And with the facilities and ability to perform in-store service and maintenance. Often while you wait.

Where do you find a store like that? Throughout the world, we know of at least 200 of them—all called ComputerLand. They're the world's largest network of independent centers specializing in the sale and service of small computers. And when you buy your computer from any one of them, *our* system is part of *your* system.

ComputerLand®

We know small computers. Let us introduce you.

Over 200 stores worldwide.
For locations call 800-227-1617 X118 (in California 800-772-3545; in Hawaii call 415-930-0777 collect).

© ComputerLand 1982

CIRCLE 25

The $149.95 personal computer.

Introducing the Sinclair ZX81

If you're ever going to buy a personal computer, now is the time to do it.

The new Sinclair ZX81 is the most powerful, yet easy-to-use computer ever offered for anywhere near the price: only $149.95* completely assembled.

Don't let the price fool you. The ZX81 has just about everything you could ask for in a personal computer.

A breakthrough in personal computers

The ZX81 is a major advance over the original Sinclair ZX80—the world's largest selling personal computer and the first for under $200.

In fact, the ZX81's new 8K Extended BASIC offers features found only on computers costing two or three times as much.

Just look at what you get:

- Continuous display, including moving graphics
- Multi-dimensional string and numerical arrays
- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function useful for both games and serious applications
- Built-in interface for ZX Printer
- 1K of memory expandable to 16K

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. And you can use a regular cassette recorder to store and recall programs by name.

*Plus shipping and handling. Price includes connectors for TV and cassette, AC adaptor, and FREE manual.

If you already own a ZX80

The 8K Extended BASIC chip used in the ZX81 is available as a plug-in replacement for your ZX80 for only $39.95, plus shipping and handling—complete with new keyboard overlay and the ZX81 manual.

So in just a few minutes, with no special skills or tools required, you can upgrade your ZX80 to have all the powerful features of the ZX81. (You'll have everything except continuous display, but you can still use the PAUSE and SCROLL commands to get moving graphics.)

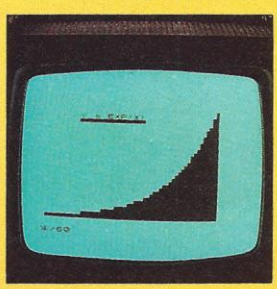
With the 8K BASIC chip, your ZX80 will also be equipped to use the ZX Printer and Sinclair software.

Order at no risk**

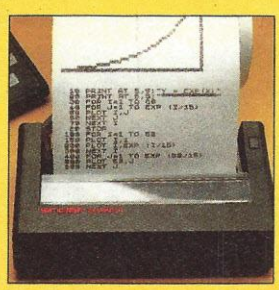
We'll give you 10 days to try out the ZX81. If you're not completely satisfied, just return it to Sinclair Research and we'll give you a full refund.

And if you have a problem with your ZX81, send it to Sinclair Research within 90 days and we'll repair or replace it at no charge.

**Does not apply to ZX81 kits.

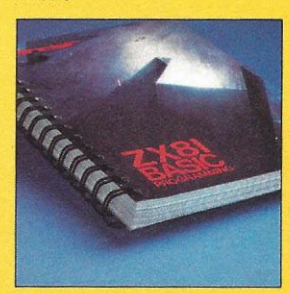


NEW SOFTWARE: Sinclair has published pre-recorded programs on cassettes for your ZX81, or ZX80 with 8K BASIC. We're constantly coming out with new programs, so we'll send you our latest software catalog with your computer.



ZX PRINTER: The Sinclair ZX Printer will work with your ZX81, or ZX80 with 8K BASIC. It will be available in the near future and will cost less than $100.

16K MEMORY MODULE: Like any powerful, full fledged computer, the ZX81 is expandable. Sinclair's 16K memory module plugs right onto the back of your ZX81 (or ZX80, with or without 8K BASIC). Cost is $99.95, plus shipping and handling.



ZX81 MANUAL: The ZX81 comes with a comprehensive 164-page programming guide and operating manual designed for both beginners and experienced computer users. A $10.95 value, it's yours free with the ZX81.

The $99.95 personal computer.

Introducing the ZX81 kit

If you really want to save money, and you enjoy building electronic kits, you can order the ZX81 in kit form for the incredible price of just $99.95.* It's the same, full-featured computer, only you put it together yourself. We'll send complete, easy-to-follow instructions on how you can assemble your ZX81 in just a few hours. All you have to supply is the soldering iron.

How to order

Sinclair Research is the world's largest manufacturer of personal computers.

The ZX81 represents the latest technology in microelectronics, and it picks up right where the ZX80 left off. Thousands are selling every week.

We urge you to place your order for the new ZX81 today. The sooner you order, the sooner you can start enjoying your own computer.

To order, simply call our toll free number, and use your MasterCard or VISA.

To order by mail, please use the coupon. And send your check or money order. We regret that we cannot accept purchase orders or C.O.D.'s.

CALL 800-543-3000. Ask for operator #509. In Ohio call 800-582-1364. In Canada call 513-729-4300. Ask for operator #509. Phones open 24 hours a day, 7 days a week. Have your MasterCard or VISA ready.

These numbers are for orders only. For information, you must write to Sinclair Research Ltd., 2 Sinclair Plaza, Nashua, NH 03061.

sinclair

AD CODE 02PC

	PRICE†	QTY.	AMOUNT
ZX81	$149.95		
ZX81 Kit	99.95		
8K BASIC chip (for ZX80)	39.95		
16K Memory Module (for ZX81 or ZX80)	99.95		
Shipping and Handling	4.95		$4.95
		TOTAL	

MAIL TO: Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061.

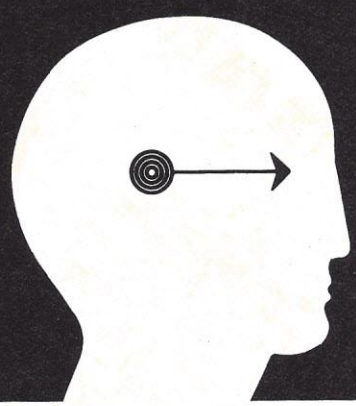
NAME _____

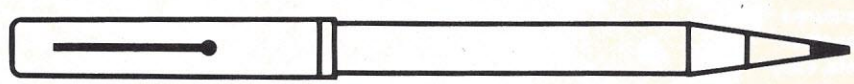
ADDRESS _____

CITY/STATE/ZIP _____

† U.S. Dollars

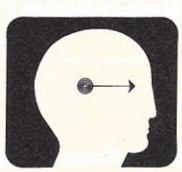
Your Name In Print





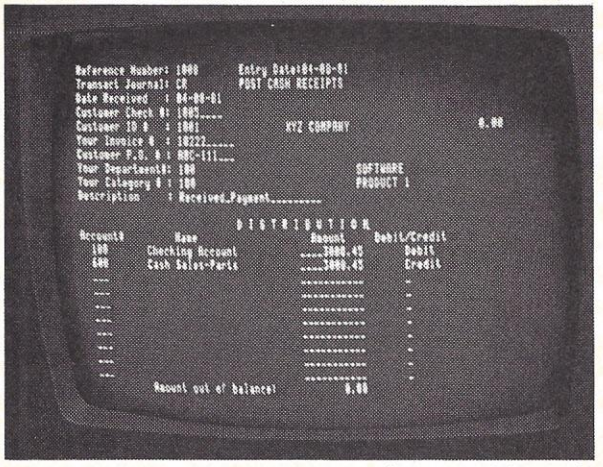
It can be. If you become an author for Personal Computing. But can you do the kind of writing we're looking for? Find out. Call or write and ask for a copy of the authors' guide.

PERSONAL COMPUTING
AUTHORS' GUIDE
50 Essex Street
Rochelle Park, NJ 07662
(201) 843-0550



Computerize your bookkeeping without terrifying your bookkeeper.

Introducing The Boss:™ the most advanced, yet most understandable, financial accounting system. Designed to automate your bookkeeping without confusion or mistakes.



Typical screen format - actual photograph.

If "fear of the unknown" is standing between you and computerization, you should find out about The Boss.

The Boss system is immediately comprehensible to bookkeepers because it utilizes virtually the same format they're used to.

So even someone with no previous computer experience can easily learn and operate The Boss system.

Features seldom found in packaged software.

The Boss system is fully interactive, fully departmentalized and exceptionally fast. It can generate an astounding number of complex reports at the touch of a button.

General Ledger and Accounts Receivable and Payable transactions can be entered in any order in a single program.

Up-to-the-minute financial reports can be obtained without batch processing.

The Boss system computes financial ratio analysis.

It protects data from unauthorized personnel as well as computer malfunction.

And it has the largest programming and storage capacity of any micro system.

The Boss runs on most small business computers with CP/M® or similar operating systems. Its cost is only $2,495.

Get full support from Lifeboat.

The Boss is brought to you exclusively and supported completely by Lifeboat Associates, world's largest computer software publisher. For more information about how you can profit from this extraordinary financial accounting system, send us the coupon below. Or call (212) 860-0300.

For more information on The Boss, mail coupon to Lifeboat Associates, 1651 Third Avenue, New York, NY 10028.

Name_____

Title_____

Company_____

Street_____

City_____

State_____

Zip_____

3210

Software With Full Support

Boss is a trademark of Balcones Computer Corp.
CP/M is a reg. TM of Digital Research, Inc.
Copyright © 1981, by Lifeboat Associates

LIFEBOAT WORLDWIDE offers you the world's largest library of software. Contact your nearest dealer or Lifeboat:

Lifeboat Associates
1651 Third Ave.
New York, N.Y. 10028
Tel: (212) 860-0300
Telex: 640693 (LBSOFT NYK)
TWX: 710-581-2524

Lifeboat Inc.
OK Bldg., 5F
1-2-8, Shiba-Daimon
Minato-ku, Tokyo 105, Japan
Tel: 03-437-3901
Telex: 2423296 (LBJTYO)

Lifeboat Associates, Ltd.
PO Box 125
London WC2H 9LU, England
Tel: 01-836-9028
Telex: 893709 (LBSOFTG)

Lifeboat Associates GmbH
Hinterbergstrasse
Postfach 251
6330 Cham, Switzerland
Tel: 042-36-8686
Telex:865265 (MICO CH)

Intersoft GmbH
Schlossgartenweg 5
D-8045 Ismaning, W. Germany
Tel: 089-966-444
Telex: 5213643 (ISOFD)

Lifeboat Associates, SARL
10, Grande Rue Charles de Gaulle
92600 Asnieres, France
Tel: 1-733-08-04
Telex: 250303 (PUBLIC X PARIS)

Lifeboat Associates

World's foremost software source

CIRCLE 28

Presentations

continued from page 39

either from its manufacturer or from the user's investigation of the third-party market.

Cost is commensurate with sophistication, and except for a few elite applications, such as equipping the computer to generate color microfilm, would be considered fair value by anyone who could use the benefit and was able to install a personal-computer system in the first place.

As if to prove that the future of business graphics belongs to all companies and not just the big ones, several personal-computer producers have recently introduced models for small-business use with graphics functions either integrated or easily included as options at the time of purchase.

Hewlett-Packard, long famous for the graphical aptitude of its minicomputers, and already having a personal computer (HP-80 series) in use for scientific applications, has incorporated this experience into the new HP 125 personal computer for general-business applications.

The 125, also usable as an intelligent terminal in a network, has dedicated printers and graphics plotters to get the most from the Graphics/125 software package. A user without programming knowledge can convert tabular data to bar, pie and line charts and prepare text slides. Multicolor plotting for paper or overhead transparencies can originate with keyboard entries or the retrieval of predefined charts and slides.

NEC's Pertec PC-8000 Series offers a color monitor for creating graphic images in as many as eight colors. Even the black-and-white version permits three brightness levels, allowing emphasis within the same display. The printer that NEC developed for the 8000-series hard copies can also be interfaced to many other personal-computer models.

Others available

The name of NorthStar's recently introduced Advantage model was carefully chosen—the "advantage" is the integrated graphics for business, word or scientific data processing. In addition to high-resolution, black-and-white generation of standard charts, and 3-D versions of those charts plus complex 3-D designs according to the user's imagination, the Advantage can be interfaced to graphics hardware and software established for the NorthStar Horizon models.

The Cromemco Z-2H Graphics System, based on a 64k personal computer with powerful hard- and floppy-disk storage capacity, provides very high-resolution—754 × 482 pixels—and an almost limitless palette of colors. Graphics software comes with the system but Cromemco's 13-inch color monitor is optional.

The versatility of the system is demonstrated by one of the "big eight" accounting firms that offers a rental and leasehold-management service to airports. Everything that a potential lessor might want to know about the configuration and availability dates of commercial space within an airport—shopping and parking concessions, restaurants, car rental and other service booths—can be viewed on videotape anywhere in the world.

As these and other approaches to personal-computer graphics demonstrate their value in the business market, more systems will follow.

THE CENTRONICS 739. MORE THAN YOU'D EXPECT FROM AN INEXPENSIVE DESK-TOP PRINTER.

The Centronics Model 739. Here's proof that inexpensive doesn't have to mean incomplete. The Model 739 will perform just as dependably as the workhorse printers that have made Centronics the leader in printer performance. Look at the key features.

CORRESPONDENCE QUALITY—Clear characters, right justified, proportionally spaced for a custom quality printing.

GRAPHICS—for business. Everything from bar charts and curves to illustrations.

3-WAY PAPER HANDLING—Cut sheet, roll, fan-folded forms.

WORLDWIDE SERVICE—One of the industry's best networks of authorized sales and service dealers and walk-in service centers.

Features plus the backing of more than 350,000 Centronics printers sold are the assurance that the quiet, reliable 739 is the best printer for the price. At your Centronics dealer. Or write directly for details.

CENTRONICS® PRINTERS

Centronics Data Computer Corp.
One Wall Street
Hudson, NH 03051

CIRCLE 29

JINSAM

Data Manager selected by NASA, Kennedy Space Center

SAVE TIME! SAVE MONEY!
JINSAM saves taxpayers 100's of thousands of $

OFFICIALLY APPROVED BY COMMODORE

"Much more powerful than you can imagine!"
Robert Baker
Kilobaud Microcomputing

JINSAM is an integrated system. It makes it easy to use your information to its fullest. No more will hundreds of valuable hours be spent searching or analyzing needed information nor re-entering information for various reports.

JINSAM transforms your desk-top computer into the "state of the art" data processing machine with features and accessories found nowhere, even at 10 times the price. NASA, Kennedy Space Center selected JINSAM 8.0 and saved approximately $95,000 over other software/hardware costs. Riley County, Kansas also selected JINSAM 8.0 and saved approximately $90,000 over other software/hardware costs.

JINSAM is designed for you. It is forgiving. It has help commands for every option, available at the touch of a button. The amount of information you store, its structure and/or your hardware can change but your data won't have to be re-entered. Recovery utilites are included even for catastrophes, security passwords are built in for privacy, simple editing and entry includes auto recall, and deleting records is easy and the space is reclaimed. JINSAM includes TWO FREE accessories for reports and labels. You have unlimited report formats with summing and lined up decimals and the label printer prints up to 5 across – any size and even allows single envelopes or index cards.

JINSAM 1.0 allows fast and easy file handling, manipulation and report generation for any CBM computer with CBM 2040 disk drive. It features a menu for ease, has encrypted passwords, 3 deep sorts, .5 to 3 second recall.

JINSAM 4.0 for CBM 4000 series adds JINSORT, user accessible machine sort of 1000 records in 15 seconds; compaction/expansion of information, automatic list maintainance, unlimited number of fields, unlimited record length and much more.

JINSAM 8.0 for CBM 8000 series has all 4.0 features plus unlimited sort, horizontal format, and search by key or record number.

JINSAM 8.2, NEW FOR '82 expands 8.0 capabilities by adding information search by word, key or record number and machine language print, format and manipulation routines.

★CUSTOM DATA FILES
★CUSTOM REPORTS/LABELS
★KEYED RANDOM ACCESS
★FAST/EASY/MENU DRIVEN
★MULTIPLE SEARCH KEYS
★PRIVACY ACCESS CODES
★WILD CARD SEARCH

JINSAM EXECUTIVE version (soon to be released) is our most powerful professional system for the CBM 8000 and 9000 series. Executive will have 8.2 extended features plus allow multiple users with in-use lockout protection, executive command files, automatic math relations, join, merge or link files, greatly increased record capacity and machine information search by word, as well as by key or record number and many, many more features.

There are currently 7 more interfacing modules – and more under development, including independent interfaces between JINSAM and business packages for your G/L, A/R, A/P needs. We announce the availability of modules and enhancements in JINSAM's quarterly newsletter.

WORDPROPACK - Intelligent interface for WordPro 3, 3+, 4, 4+, creates lists of information from JINSAM files. It allows up to 10 conditions based on each item of information. Produce individualized letters, report cards, special reports, checks, invoices, etc.

MULTI-LABEL - Prints multiple labels per record with up to 2 lines for messages and consecutive numbering. Produce inventory, caution labels, bulk mail labels, etc.

MATHPACK - global calculator/editor +, −, *, /, by another field or constant; null (remove contents) of a field or replace contents of a field with any word, number or phrase. Sum multiple fields in each record or running sum of single field in all records. Extract information or effect permanent change. Replace in the same field or place in a waiting field.

DESCRIPTIVE STATPACK - Determine MEAN, MEDIAN, MODE, STANDARD DEVIATION, VARIANCE, RANGE. Generate HISTOGRAMS from 1 to 25 steps, and produce Z-SCORE reports.

ADVANCED STATPACK - (You must also acquire DESCRIPTIVE STATPACK) Generate one, two or three way CROSSTABS (number of occurance) CHI SQUARE, LINEAR REGRESSION, with graphic representation and prediction, LINEAR CORRELATION and SIMPLE ANALYSIS OF VARIANCE.

CALCPACK - 2 way interface to VisiCalc or any user program. It lets you use VisiCalc for complex manipulation, editing, placing results in JINSAM for sorting, storing or moving data to WordPro as well as giving the ability for exchange with your own applications.

INTERAC - Interface which can read VisiCalc files, WordPro files and almost any sequential files to build JINSAM databases automatically. For example: You could "download" information on holerith cards to sequential files and INTERAC would place them into JINSAM files.

All accessories are accessed thru the JINSAM menu and require security password to gain entrance.

JINSAM gives you FREEDOM OF CHOICE. Start with JINSAM 1.0 and upgrade hardware and data at any time. Choose from accessories at any time. The JINSAM Newsletter brings the latest updates, user input and uses and keeps an eye on the future.

JINSAM stands alone by placing "a lot of potential computing power in one integrated program package" (Fred Klein, Ferson div. of Bausch & Lomb). "The JINSAM package is justification for buying a system no matter what the hardware, be it Vector or Commodore or whatever the system" (Larry Colvin, Micro Computer Systems). It is a "grandfather" in this young field since the first JINI MICRO database system has been marketed since 1979. JINSAM EXECUTIVE will be the third generation in development. All JINSAM systems are sophisticated and flexible yet easy to use. JINSAM is saving its users valuable time and money in government, educational and research institutions, business and industry worldwide.

JINSAM is a Commodore approved product. See your local dealer for a demonstration.

JINSAM is a trademark of JINI MICRO-SYSTEMS, Inc.
WordPro is a trademark of Professional Software, Inc.
VISICALC is a trademark of Personal Software, Inc.
CBM is a trademark of Commodore Business Machines, Inc.

JINSAM Data Manager

. . . . Additional Information and nearest dealer
. . . . Newsletter Subscription ($5 US/$8 Worldwide)
. . . . JINSAM Demo Disk ($15, plus shipping & tax)
. . . . User's Guide ($40.00, plus shipping & tax)

Please send to:

Name _____

Position _____

Company _____

Address _____

City, State, Zip _____

Phone ( ) _____

Computer, Disk _____

Application _____

JINI MICRO-SYSTEMS, Inc.
Box 274C • Kingsbridge Station
Riverdale, New York 10463
(212) 796-6200

Dealer Inquiry Welcome

CIRCLE 27

Investigative research

continued from page 47

Mart, is an information-brokerage service which has been helping people with information needs for nearly 10 years.

"I can locate published data about any subject you can name," Bellomy states. "I'm currently accessing 300 different on-line services, but if a potential client needs information that's not available in one of those 300, I can subscribe to the one that will give me the information for which I'm looking."

Bellomy maintains that his service was one of the first of its kind to open its doors to the public, although there are more than 100 like it in the U.S. today.

"There are hundreds of data bases on the market, but not everyone can justify the access cost," Bellomy says. "That's where The Info-Mart comes in. A company with information needs that can't quite see investing in a computer and subscribing to an on-line service will call me."

A lot of businesses and individuals seem to fit into that category. Bellomy says he has hundreds of entries on his client roster; some of them are one-time customers and others come back again and again.

"While a medium- to large-size law firm will have its own computer and subscribe to the LEXIS or WESTLAW services, the firm with two or three attorneys will turn to me as a resource," Bellomy says. "I'll charge about $450, do a thorough search, produce a printed, bound report and take about two weeks to do it."

Bellomy's technique is thorough. Once he's ascertained what it is the client wants to accomplish, he seeks the best data base for the job, goes into it and selects a few pertinent citations to read. He repeats this process two or three times until he's convinced that he has put together the kind of comprehensive information for which his client is looking.

"I had a call from an attorney whose client was filing suit against a pharmaceutical company," Bellomy says. "His client maintained that she had contracted a serious illness from a particular pill the company manufactured. The attorney wanted to establish that warnings had appeared against this pill in prior medical literature, and that the company should have alerted the medical community and the public to this fact.

"I did a search and discovered that there were numerous articles referring to the pill and its effects. The attorney could have spent days in the library poring over medical journals, but I got him the information he needed in a fraction of the time," Bellomy says.

Bellomy thinks it would take the average person about 200 hours of diligent searching to find the same data he can collect in just a few hours with the data bases. Considering that, $450 seems fairly reasonable.

"The concept of a computerized information library is a modern phenomenon that's going to get bigger and bigger," Bellomy states. "As more businesses invest in personal computers to automate certain basic office functions, more businessmen are going to become aware of the vast resources available to them through those computers."

But won't that have a negative effect on the booming business Bellomy is doing today? "Well," he says, "maybe it'll come slower than I think."

CompuServe Update

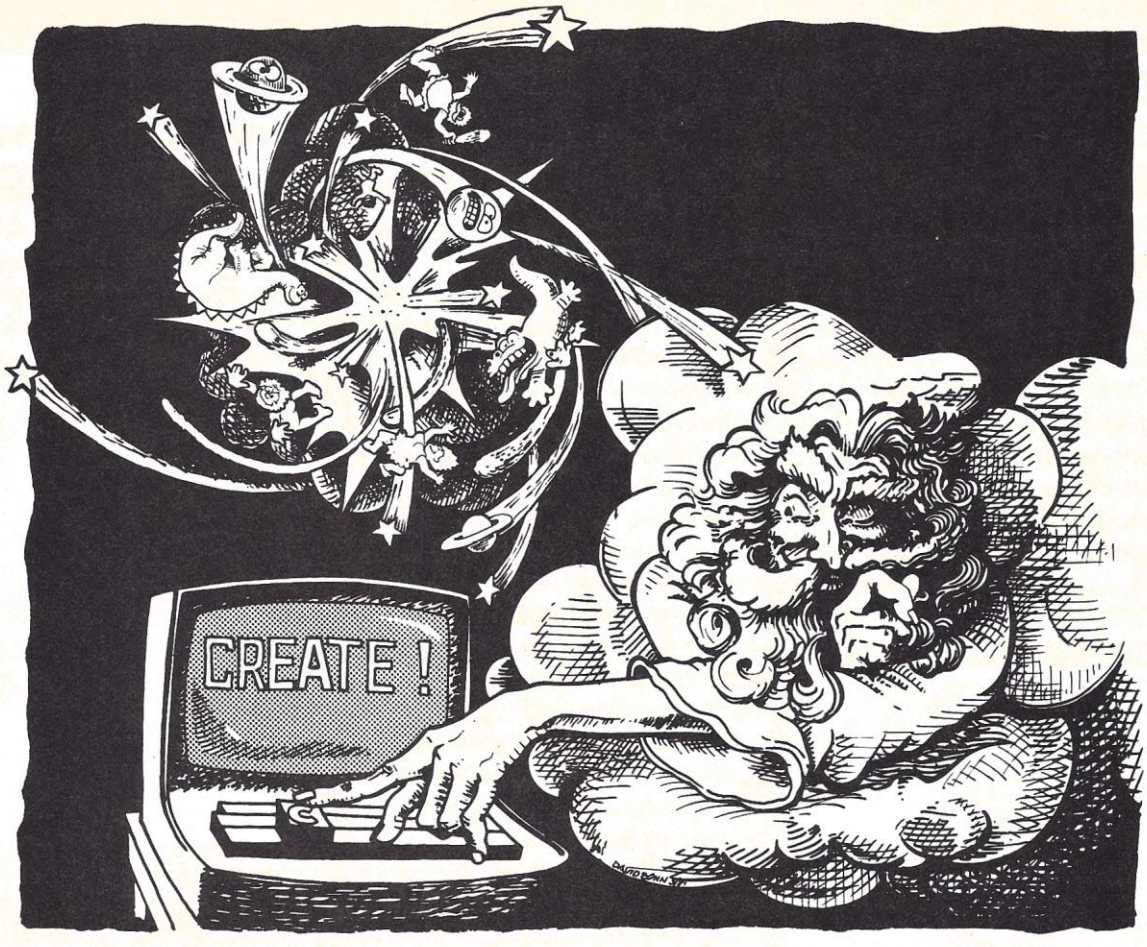
The CompuServe Information Service is the largest and fastest growing videotex system in North America. Our customer base has increased a dramatic 300% over the past 12 months. And there's a reason:

■ our broad base means more communications between users ■ a wide variety of high-value data bases ■ games to excite any aficionado ■ up-to-date financial information to give you a competitive edge on the market ■ new services like electronic shopping ■ free subscription to our informative TODAY magazine ■ easy-to-follow instructions for the novice and powerful services for the experienced user ■

Ask for a demonstration at a Radio Shack® Computer Center. Videotex software is available for various brands of personal computers. CompuServe Information Service, 5000 Arlington Centre Blvd., Columbus, Ohio 43220. (614) 457-8600.

CompuServe

CIRCLE 30



if He'd used select™ it wouldn't have taken seven days

Learn SELECT* in just 90 minutes. A whole new word processing software concept that kicks the coded key habit and frees you from complicated instruction manuals. *SELECT* is fast. *SELECT* is logical. With single key mnemonics, you'll use dozens of commands that instantly access the rich capabilities of this system. There's nothing like it.

Simply hit "C" and you'll be ready to Create a document.
Key "I" and you'll be in the Insert mode.
Key "M" and Move entire blocks of text . . . and key dozens more.

That's all there is to it. You'll get all that word processing software promises . . . plus a few surprises.

SELECT with SUPERSPELL.* The only microcomputer software with an integrated spelling dictionary. To proof your text all you do, of course, is to key "S". *SUPERSPELL* with its 10,000 word dictionary scans your text at computer speed then displays and corrects all your typing errors. You can increase *SUPERSPELL*'s word power and customize the dictionary by adding new words, one at a time. Ask to see it today at your local dealer.

SELECT with SUPERSPELL . . . just a little byte more.™

SELECT will run on any machine that uses CP/M or MP/M** or its derivatives. It needs 40K of RAM and two disk drives. Special version now available for Radio Shack Mod II*** and Apple II****

* SELECT and SUPERSPELL are trademarks of Select Information Systems Inc.
** CP/M and MP/M are trademarks of Digital Research
*** A trademark of Tandy Corp.
**** A trademark of Apple Computer Inc.

select INFORMATION SYSTEMS™ 919 Sir Francis Drake Boulevard • Kentfield, California 94904 • (415) 459-4003

CIRCLE 76

feel that they have some control over the change."

But Dr. Peelle also sees managers having their own problems when initially using computers. "The manager himself may resist the use of personal computer He may see the use of a computer as not within his role, but rather a secretarial task, a lower-status task."

This view is in agreement with that of Dr. Joyce Brothers, who feels that executives relate to a computer's keyboard as they relate to the key-

Dr. Brothers: "Don't set unnecessary emotional blocks in your way."

board of a typewriter—that this is something a secretary does, not an executive. It is Brother's opinion that executives will fare better with voice-actuated computers.

To avoid this jolt to the ego, Peelle suggests that "managers become the success models for their workers. Once a manager is using a personal computer, he will be able to handle large amounts of information. He'll make higher-quality decisions. He'll be seen as the one who uses advanced technology, the one who is on the leading edge. And that's where status and success are tied in—and where frustration is avoided."

Oh, those kids

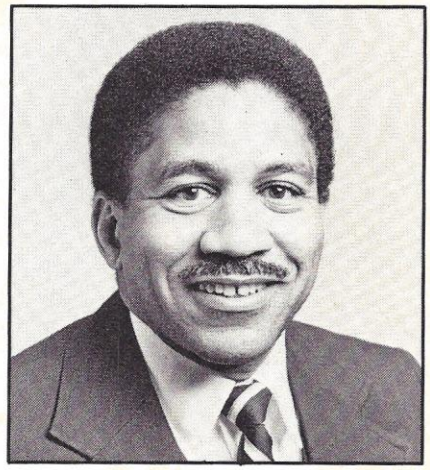
People often say that children take to computers like ducks take to water. Dr. Gordon Berry, UCLA professor and chief educational consultant on the Children's Discovery Learning System by Mattel, says that, "The child's readiness to learn personal computing has to do with his maturity. If the child is ready to use it, and if the learning is a correct process, then the child will not throw a new tool away when he first meets it. So one of the first principles to use to avoid frustrated children is to make sure the children are ready. Learning personal computing is like anything else. It's an active process, not a passive one, building on what the child knows, and making the new knowledge part of a familiar universe."

But perhaps most important for adults who want to learn computing is Berry's contention that children, unlike adults, are not intimidated by computers. Maybe adults need to realize they are going to make many mistakes. Jack Nevison, of Nevison and Associates, a Boston firm that teaches executives how to compute, says, "Computing, like no other activity, teaches you humility."

It is Nevison's contention that frustration when computing is just the result of unanswered questions. "You're frustrated if you are puzzled in such a way that you see no solution to the problem—if it's an intractable question. But there are all sorts of tractable questions like 'Why doesn't this program work right now? Why don't you put some more print statements in your program and see what the variables are?' Asking these questions makes computing challenging, not frustrating."

To Nevison, you have to have a very high tolerance for frustration because around computing there are large areas to which logic does not apply, such as the operating system commands. How do you save a program? How do you copy a program? How do you edit a program?

"These are all arbitrary rules. What you should do is devise your own little manual, develop your own notebook—a personalized user's manual. Or you must learn how to use the manufacturer's manual, which is essentially a thesaurus or a



Dr. Berry: "A child will not throw away a new tool when he meets it."

dictionary. But if you develop your own, you won't have to keep rummaging around in the big book, which is very frustrating—knowing the answer is there but not knowing where," says Nevison.

Learn the language

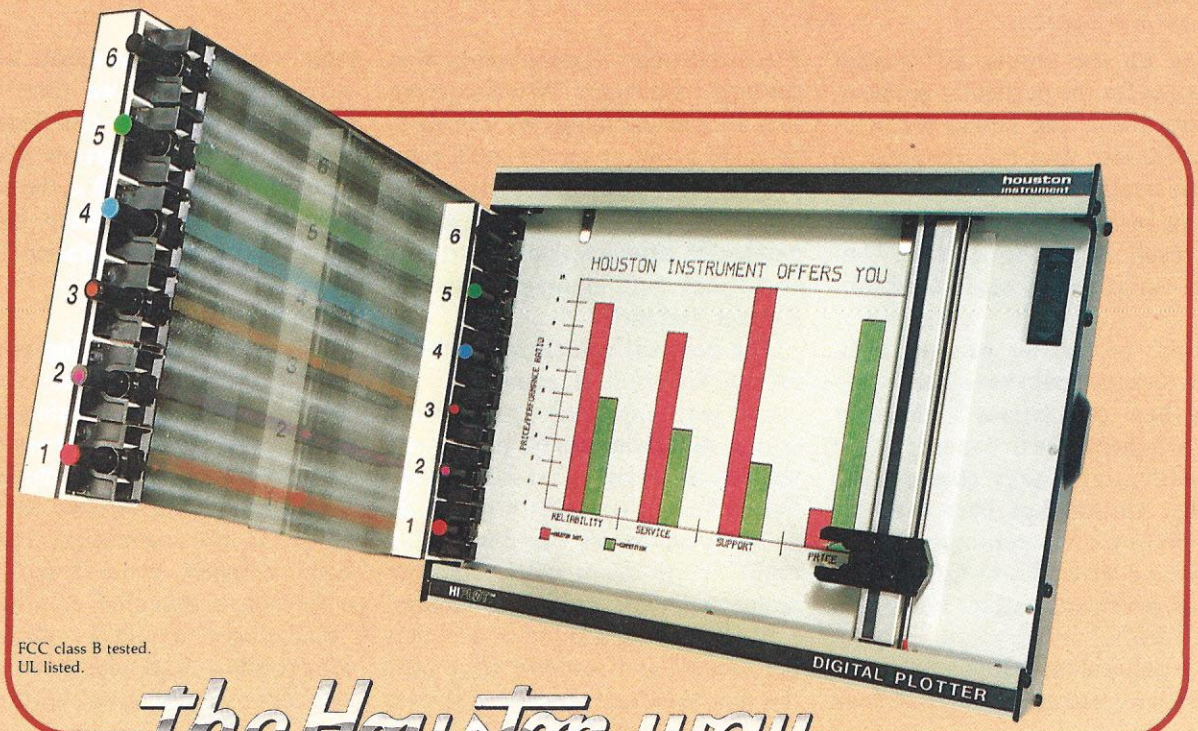
You must be very careful, according to Nevison, to distinguish between two kinds of things: logical problems that are solvable by reasoning and problems whose only solution is knowledge of language. How do you know which is which?

"You need to know the language of the operating system. Most of that is not very logical, like any language. You need to have a book that guides you through it. You also need very elementary illustrations of the logical things you can do within a computing language. The contents of your net set of primary tools depends greatly on what you plan to do first.

"The elements of syntax in a language are arbitrary. Once you've learned the language, you're working in a reasonable universe."

continued on page 140

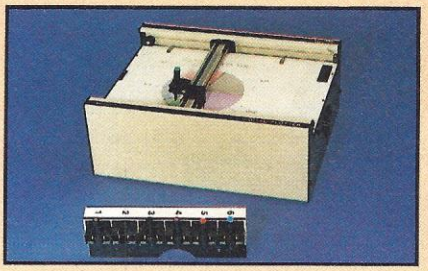
New from HIPLØT™
multi-pen plotting for as little as $1480*.



FCC class B tested.
UL listed.

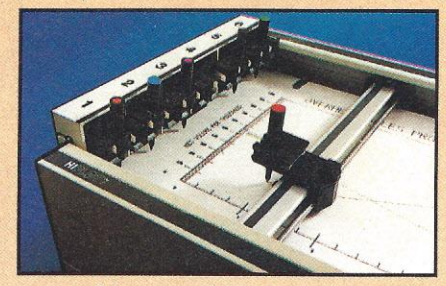
the Houston way

The new HIPLØT DMP Series 6-pen option makes high performance multi-pen plotting affordable. It's available on the DMP 2, 3, and 4 models in the HIPLØT family so you can enjoy the advantages of multi-colored plots on 8½" × 11" (DIN A4) surfaces. Of course, you also get the standard HIPLØT range of capabilities such as intelligence, controls, interfaces and resolutions. There's a model for virtually every plotting application.



Big Performance in a Small Plotter

Since it's introduction, the HIPLØT DMP Series has been recognized as the innovative plotter line which made low-cost, high performance digital plotting a reality.



Now, with our new 6-pen option, there's an exciting new dimension in the DMP Series' versatility. Imagine two standard models with RS-232-C and parallel interfaces, four intelligent models with RS-232-C or Centronics®compatible interfaces, a choice of controls, resolutions, and pen speeds. Add to this the ability to plot with 6-pens on paper, vellum or mylar (ideal for overhead projectors) and you have the ultimate plotter price/performance combination — the perfect choice for the user or OEM.

8-Pen Models Also Available.

If you need a little more capability, take a look at our new 8-pen option. It's available on the DMP 5, 6, and 7 so you can have 8-pen multi-colored plots on 11"×17" (DIN-A3) surfaces.

Why wait? Let us send you complete information on this breakthrough in **affordable, multi-pen plotting.** *Contact Houston Instrument, P.O. Box 15720, Austin, Texas 78761. (512) 835-0900. For rush literature requests, outside Texas, call* **toll free 1-800-531-5205.** *For technical information ask for operator #5. In Europe contact Houston Instrument, Rochesterlaan 6, 8240 Gistel, Belgium. Phone 059/27-74-45.*

INSTRUMENTS & SYSTEMS DIVISION
Together...we'll create tomorrow.

BAUSCH & LOMB

TM Trademark of Houston Instrument.
* U.S. Suggested retail prices.
Centronics® registered trademark of Centronics Data Computer Corp.

CIRCLE NUMBER 34 FOR LITERATURE
CIRCLE NUMBER 35 TO HAVE A REPRESENTATIVE CALL

Weather

continued from page 52

setting up the proper differential equations for the particular problem, running them, and noting the solutions. He also uses the computer to handle statistical calculations involving many subcalculations. The end result might be a graph that shows variations in wind speed over time.

Before he had his personal computer, Dutton would have had to perform these calculations by hand or "get somebody else to do them on the big computer," says the meteorologist. Dutton has been working with his own computer for a year and a half and writes his own programs, but has never bothered to "fiddle with FORTRAN."

It is no accident that personal computers have become popular at Penn State while most of meteorology is on the larger machines. "We discovered that a lot of the things we wanted to do could be set up on the small computer," says Dutton. With these machines, they are able to model particular atmospheric conditions, statistical data management and weather graphics.

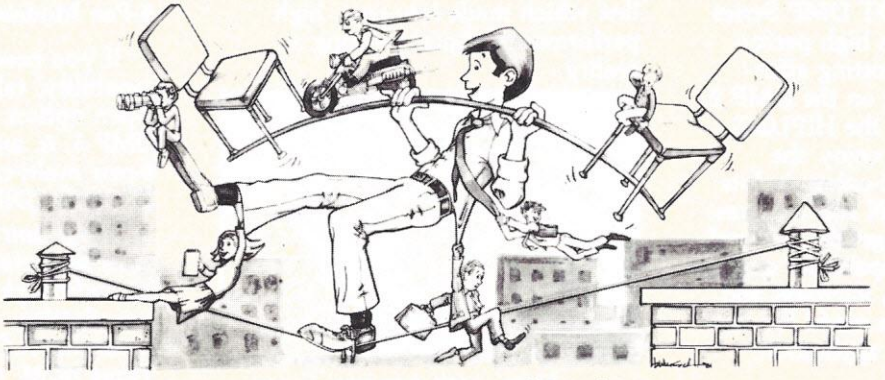
The personal computers are used to run differential equations and other mathematical calculations critical to weather study. In research weather reporting, speed is not essential, so Dutton is not disturbed if the personal computers "have to run all night" to perform work that the larger computers could do in minutes.

More important is the control that the faculty and students have over the machines and, as a result, over their work. "We can diddle around with any problem we like," says Dutton, emphasizing the flexibility the personal computers give to meteorological research at the school. And the machines help Dutton "avoid laborious computation."

Even more

Dutton foresees growing application of the personal computers in weather studies. In addition to the work he and his colleagues are doing, he suggests that the machines are useful as control devices for measurement instrumentation. The personal computer, in the form of either a keyboard machine or simply a "black box," could be placed at remote sites. A telephone call to the computer would give weather re-

RM/COBOL MAKES IT ACROSS!



...FROM ONE OPERATING SYSTEM TO ANOTHER!
A VITAL WAY TO PROTECT YOUR SOFTWARE INVESTMENT FOR THE FUTURE!!

The **RM/COBOL**™1 language runs on more different Operating Systems and more different-sized computers than any other similar language. For starters, it runs on NCR and TI minicomputers and, in the micro field, on the CP/M[2], MP/M[2], CP/M-86[2], MP/M-86[2], TRSDOS[3], OASIS[4], MOASIS[4], and UNIX[5], (ONYX version) Operating Systems...to mention only a few.

Until now, serious business software of the scope and flexibility seen in the minicomputer world has not been available on micros. **RM/COBOL**™1 now allows transfer of such software with a minimum of fuss.

We have participated in such a mini-to-micro transfer of a major set of general business software...using **RM/COBOL**™1 as the transfer mechanism, of course. Running on literally thousands of minicomputers, these refined, enhanced, and proven software packages cover A/R, A/P, G/L, P/R, Order Entry (with Invoicing and Inventory Control) as well as Sales Analysis. The Packages define a new level of achievement for features and flexibility in micro applications software and offer top quality at a reasonable price.

For immediate information, call 714/848-1922 for your complete product descriptions.

RM/COBOL™1 **and CRT! from CYBERNETICS ARE GOING STEADY...**

...AND YOU'RE GONNA LOVE 'EM TOO!!

Use your computer to program itself. **CRT!** ™6 (Cobol Reprogramming Tool!) from Cybernetics is a program generator for **RM/COBOL** ™1 that produces error-free **RM/COBOL** ™1 source programs for data input, file maintenance, and report printing programs.

A full feature interactive program generator, not a sub-set! Call Now! 714/848-1922.

Trademarks of:
1-Ryan McFarland Corp.; 2-Digital Research, Inc.; 3-Tandy Corp.; 4-Phase One Systems, Inc.; 5-Bell Telephone Laboratories, Inc.; 6-Cybernetics, Inc.

CYBERNETICS INC

8041 NEWMAN AVE., SUITE 208
HUNTINGTON BEACH, CA 92647
714/848-1922

The powerful package:

Super-Text II™

Allows you to learn the basics of text editing quickly. Advanced features will meet your expanding word processing requirements far into the future. $150.00

plus Form Letter™

Provides automatic repetitive printing of letters. Allows insertion anywhere in a letter, also direct entry, optional prompting, special commands. $100.00

plus Address Book™

Stores names, addresses, and telephone numbers and prints mailing labels. Has user-definable category system. $49.95

From the leader in word processing for the Apple II or II Plus

MUSE SOFTWARE™

347 N. CHARLES STREET
BALTIMORE, MD 21201
(301) 659-7212

Apple II is a trademark of Apple Computer Corp

Call or write for information and the name of your nearest **MUSE** dealer

CIRCLE 37

searchers access to the data being collected at that site while the machine also controlled the data-collecting instrumentation.

In California, efforts are already well under way to take personal computer developments out of the weather laboratories of large universities and put them to actual use in the field. Roland Hauser of Narrowcasting describes part of his work as "using personal computers as a way to unlock the research lab."

Personal computers being used by Narrowcasting Inc., a not-for-profit weather information center, provide actual weather information to managers, quickly, accurately and geared to their exact location and need. In one test in progress, agriculture and air-pollution control officers from nine countries north of Sacramento, Calif., are using the Narrowcasting system to lessen the effects of pollution from burning rice straw.

Rice straw is a residue left after a rice harvest, explains Dave McBride, Yuba County agricultural biologist and air-pollution-control specialist. The rice residue doesn't mix with the heavy but shallow clay-based soil of the valley. The buildup of the residue quickly leads to disease in new rice crops, so it is necessary to burn the residue.

The burning residue generates an irritating air pollutant, and a large outcry from nearby cities like Sacramento. The rice farmers, thinking it would help the problem, burned all their fields over a very short period. But they didn't take into consideration an important factor in air pollution—weather conditions.

Guided by personal computers in each county office, combined with appropriate weather data from Narrowcasting and actual weather reports from instrument stations in the fields, the burn is now being spread over many days. To minimize the effects of pollution, particular fields are selected for burning on a given day based on weather conditions. Of particular concern are conditions that would lead to weather inversions (like those that produce heavy smog in Los Angeles) which trap the smoke from the burn and prevent it from dissipating. "The computer lets us pinpoint the best spots to burn," says McBride.

County computers

Each county office has an Apple II with 48k memory, disk drives and a printer. Two offices, Yuba County and Glen County, act as central of-

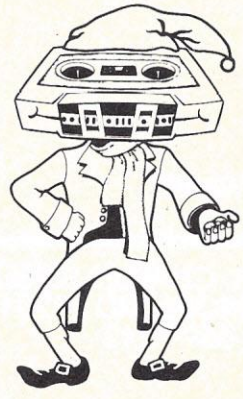
OVER 70 TRS-80 PROGRAMS *ON TAPE* EACH YEAR . . .
. . . FOR UNDER $0.75 (THAT'S SIX BITS) APIECE!

For the MODEL I & III

Ol' Ebenezer Cload wiped his glasses off — and grabbed for his gold pouch! With **CLOAD** Magazine, he could use and enjoy his computer for the price of a turkey with stuffing! And he could send Bob home early, since the programs did not have to be typed in!

He now gets a 30 minute tape each month with 7 or more practical, tutorial, utility, and game programs to **CLOAD** and run. While he **CLOADs** the programs, he reads the editor's babblings that come with each tape.

Don't let ghostly images cloud your TRS-80's screen. Get a subscription to **CLOAD** Magazine!



The Bottom Line:

1 year (12 issues)	$42.00
6 months (6 issues)	$23.00
Single copies	$4.50
Anthology #1	$10.00
Anthology #2	$15.00

MasterCard/Visa/Gold also welcome

The Fine Print:

Issues are sent First Class Mail.
All issues from Oct. 78 on available — ask for list (24 Level I issues also)
Programs are for 16K Level II, 16K Model III, and occasionally for disks.
Calif. residents add 6% to single copies and anthologies. Overseas — add $10 to subscriptions, $5 to anthologies, and $1 to single copies. Sent AO rate.
TRS-80 is a trademark of Tandy Corporation.

CLOAD Magazine Inc. © 1981
P.O. Box 1448 Santa Barbara, CA 93102 (805) 962-6271

CIRCLE 38

For the COLOR COMPUTER:

You just spent your vacation money on the Extended BASIC Color Computer, and now you want to buy software!!!???

Don't skip meals — get **CHROMASETTE** Magazine! Each month your computer will get a balanced diet of 6 or more programs on cassette (just load and run!). Also, along with the tape comes some notes on the programs and tidbits on the Color Computer world.

CHROMASETTE Magazine — for those who relish every byte (that pun even hurt me).

The Bottom Line:

1 year (12 issues)	$45.00
6 months (6 issues)	$25.00
Single copies	$5.00

Calif. residents add 6% to single copies.
Overseas — add $10 to subscriptions, and $1 to single copies. Sent AO rate.

The Fine Print:

Issues are sent First Class Mail.
All issues from July 81 on available – ask for list. Programs are for the Extended BASIC model only.

MasterCard/Visa welcome!

Chromasette Magazine
P.O. Box 1087 Santa Barbara, CA 93102 (805) 963-1066

CIRCLE 39

TRS-80™ PROGRAMS
SUPER SOFTWARE AT SUPER PRICES

THE ULTIMATE DISK-OPERATING SYSTEM

LDOS™

A completely documented new generation of operating system for the TRS-80. Far superior to any on the market. It is a totally independent device system, capable of device linking, routing, setting, and filtering. LDOS will support 5" and 8" floppies, single/double density, single/double sided, and up to 80 tracks. Full customer service provided with a toll free 800 number. Excellent documentation in a tab indexed manual (over 250 pages). Call or send for more information today.

Available for Model I or III . . . . . only $169.00

LDOS™ is a product of Logical Systems Inc.

ALSO AVAILABLE

EDAS 3.5 Model I and III. . . $79.00
EDAS 5.0 Model II. $179.00

Host Model II was. $199.00
now. $99.00

MAILING SYSTEMS

are then completed later in a "batch mode". The System comes complete with extensive documentation and ongoing support. . . . . **Contact Galactic Software for detailed specifications for your exact needs. Available only for the TRS-80 Model II.**

BUSINESS SYSTEMS

INVENTORY MASTER SYSTEM

A program to fill your needs, handling up to 2700 items. With today's market, keeping on hand only what your demand calls for is reason enough to let your TRS-80 accurately and effectively take care of your inventory. Always know what to stock and when to stock it. Have a multitude of reports at your finger tips. This system has many features which were modeled after a main frame system of large capacity. More information available upon request.

galactic software ltd.

11520 North Port Washington Road
Mequon, Wisconsin 53092

MAILING SYSTEMS

MAIL/FILE - SERIES II

NEW RELEASE

NEW Series II Mail/File has all of the outstanding features of the original Series I Mail/File, PLUS many additional qualities which again will set standards for this type of system. "Word processor" type input editor, fast sorting, and fabulous editing capabilities are a few of its features. Name and ZIP code are under constant sort. Series II is compatable with Series I data files.

Model I system will handle up to 600 names.
Model III system will handle up to 1200 names.
Either system available for only. $159.00
Also available for the Model II. $199.00
Handling up to 2500 names per file

MASS/MAIL SUBSCRIPTION SYSTEM AVAILABLE FOR MODEL II. THE ULTIMATE IN MAILING SYSTEMS

"I think the system will stand the test of time . . . it is probably the most sophisticated system around for the micros today"
Mike Schmidt (EDITOR) *80-US Jan/Feb pg. 94*

Galactic's Mass/Mail System was designed with the needs of the large mailing list in mind. This system has capabilities of handling up to 10,500 records, with access times of less than 15 seconds and usual access of about one second. All adds, deletes and edits are instant for the operator and

Model I version just. $159.00
Model III version just. $259.00

ALSO AVAILABLE . . .
For the MODEL I or III

STOCK MARKET MONITOR

Cassette version. $89.00
Disk version. $99.00

ULTRA-TREK GAME

Can you master this trip through the galaxies? As commander, will you be able to keep the Enterprise and its crew en route and on patrol? Can you destroy the hostile base? Order today.

Model I or III version only. $19.95

Send me the following:

☐ LDOS Model I. $169.00	☐ INVENTORY MASTER Model I. . . . $159.00
☐ LDOS Model III. $169.00	☐ INVENTORY MASTER Model III. . . $259.00
☐ EDAS 3.5 Model I. $79.00	☐ STOCK MARKET MONITOR Model I
☐ EDAS 3.5 Model III. $79.00	cassette. $89.00
☐ EDAS 5.0 Model II. $179.00	disk. $99.00
☐ HOST Model II. $99.00	☐ STOCK MARKET MONITOR Model III
☐ MAIL/FILE II Model I. $159.00	cassette. $89.00
☐ MAIL/FILE II Model III. $159.00	disk. $99.00
☐ MAIL/FILE II Model II. $199.00	☐ ULTRA TREK Model I. $19.95
☐ INFO ON MASS/MAIL MODEL II	☐ ULTRA TREK Model III. $19.95

☐ I WOULD LIKE MORE INFORMATION ON THE FOLLOWING: _____

☐ CHECK ENCLOSED ☐ C.O.D. ☐ VISA CARD NO. _____
☐ MASTERCARD NO. _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Mail to: galactic software ltd. 11520 N. Port Washington Rd. Mequon, WI 53092 B82E

Can't wait? call 414/241-8030

VISA master charge

TRS-80 A Trademark of Tandy Corp.

CIRCLE 97

fices. Each day the fields ready for burning are entered into memory and daily printouts of "ready acreage" are received for each county.

McBride is very impressed with the Narrowcasting information. "We can get details for areas as small as 40 square miles," he reports. By combining the Narrowcasting data with information from weather stations scattered throughout the nine-county basin, county officials, using personal computers, often have accurate weather information before the local media, says McBride.

The rice burning program began over a year ago when Hauser approached the county officials with Narrowcasting's MCIDAS program as a way to solve the pollution-control problem. Narrowcasting, in conjunction with the University of California, put together a program to develop the crucial ventilation figures for the entire basin, says Glen County Agricultural Commissioner Ed Romano.

The final step was to put a personal computer in each county office, allowing the data to be quickly communicated between offices so field burning could be scheduled. It is a massive job, Romano points out, with approximately 500,000 acres of rice in the nine-county basin.

The system, using telephone lines for communication between computers, was turned on this past September and already is a success, says Romano.

What else?

Now that each county office has its own personal computer, Romano foresees increased use of the machines. "They will serve more than one purpose," he says. He would like a program using similar weather information to regulate spraying of the fields, and eventually the personal computers may be used for irrigation planning.

In the meantime, Romano hopes to get the county records and books into the personal computers. "This is our first project. We are just learning to use these things," he states. Romano believes that many western cities, especially, would benefit from the combination of weather data and computers, particularly for air-pollution control.

It is in the area of "real-time weather" that Hauser sees the personal computers being particularly effective. What good does it do someone to know what the weather is like at the nearest major airport, he asks, when the real concern is a nearby

Prepare them for their future

In a society bound together by information, computers are as fundamental to a child's education as reading and writing. In this age of such rapid change, learning itself is an essential skill. Today's children will be adults in a complex, computerized society.

Young children can take to the computer as effortlessly as they learn to speak. Why not use this time to its fullest advantage?

The microcomputer is the ideal learning companion. Its patience is infinite, and its feedback is immediate. Well-designed software systems from Edu-Ware create comfortable interaction between children and the computer, making learning easy.

The microcomputer's high-resolution graphics capture even the youngest child's attention and facilitate comprehension.
Apple is a registered trademark of Apple Computer, Inc.

SPELLING BEE™ with READING PRIMER™
our two companion programs introduce the concept of words and spelling to learners, ages 3-6, by linking abstract verbal symbols (words) with familiar objects (pictures).
Applesoft, 48K, DOS 3.3 $39.95

COUNTING BEE™
colorful learning units develop a child's (ages 3-6) familiarity with counting, addition, subtraction, shape discrimination, weights, and measures.
Applesoft, 48K, DOS 3.2 or 3.3 $29.95

COMPU-MATH™ ARITHMETIC SKILLS
moves into more serious instruction, teaching entry-level skills (addition, subtraction, multiplication, division) and forming the foundation of Edu-Ware's COMPU-MATH series. Suitable for ages 6-10 and remediation of older learners.
Applesoft, 48K, DOS 3.2 or 3.3 $49.95

Each Edu-Ware system features a learning management mode, which allows parents and teachers to preset the system, with emphasis and duration tailored to an individual child's needs.

EDU-WARE®
The Science of Learning™

Other Apple learning systems from Edu-Ware include COMPU-MATH™ FRACTIONS, DECIMALS, ALGEBRA 1, COMPU-READ 3.0, and COMPU-SPELL. FRACTIONS, DECIMALS, and COMPU-READ 3.0 are available in Atari BASIC.

Edu-Ware is a registered trademark of Edu-Ware Services, Inc.

Edu-Ware Services, Inc., P.O. Box 22222, Agoura, CA 91301 (213) 346-6783

CIRCLE 41

field? Personal computers can be especially powerful handling the actual local weather data.

Narrowcasting doesn't ignore the value of the large computers in weather forecasting. The organization has its own MCIDAS program, which takes in all the available data. To be truly useful, however, those data must be taken down to the local level and, if necessary, corrected to account for what is happening in the particular location. "The farmer can often see that the large computer [prediction] is wrong," says Hauser. This is the kind of weather study that results in local decision making, says Hauser.

As the economy determines the need for accurate, immediate, very local weather information, the personal computer will find broader acceptance in the world of meteorology, Hauser says. The Narrowcasting system is currently being tested by a variety of people who need Hauser's kind of weather information, the rice growers among them.

From the field

Getting that kind of information will be the job of the personal computer. "You need the smaller machines to get the information out of the big ones," says Hauser. Personal computers will also gather information from the field, controlling measurement instrumentation and tracking local data.

Personal computers are allowing people to take part in a weather-information revolution, bending and shaping the worldwide stream of weather data to their particular needs. These machines are helping people to intelligently address critical issues such as air pollution, weather resources and energy needs.

For businesses and activities in which weather plays a crucial part, the efforts of the California rice counties and organizations like Narrowcasting offer the promise of better decision-making ability through the integration of personal computers with the giant weather data stream.

For those who study weather, personal computers offer a new tool for manipulating data and ultimately understanding more about how weather works. Weather-program libraries, such as the one at MIT, are only just getting under way.

It is in weather-based management decision making, requiring quick, accurate weather data, that the personal computer is soon most likely to shine.

Consider the classroom of the future...

To meet the demands of an increasingly complex world, the classroom will become a "Learning Environment" which coordinates space, work surfaces, group and private interaction, audio/visual presentations, printed material, and electronic media. Within that integrated classroom, instructional software will turn the microcomputer into a powerful teaching tool.

Why Computer Mediated Instruction? The microcomputer personalizes learning; it frames learning within an individualized situation. It combines vital immediate feedback with infinite patience. Its screen displays capture attention, while the learner advances at his or her own pace.

COMPU-READ 3.0™
A series of instructional software modules build learners' skills by strengthening the perceptual processes essential to competent reading. Suitable for all ages.
48K, Applesoft, DOS 3.2 or 3.3 $29.95; 48K, Atari Basic, Disk $29.95.

COMPU-MATH™
Three self-contained systems in elementary math meet both school and consumer needs. ARITHMETIC SKILLS teaches the primary or remedial learner counting and the four basic operations. FRACTIONS provides definition and operations plus rounding off and percentage.
ARITHMETIC SKILLS $49.95, FRACTIONS $39.95, DECIMALS $39.95
48K, Applesoft, DOS 3.2 or 3.3 $39.95.

ALGEBRA 1
A powerful computer mediated instructional system develops core skills in introductory algebra, supports adjunct or stand-alone learning in the home or classroom, and encourages experimentation with a variety of "learning styles." Flow-charted information maps mark the learner's progress and recommend a sequence to follow through the system's units.
48K, Applesoft, DOS 3.3 $39.95.

COMPU-SPELL™
This elaborate system teaches spelling by refusing to allow learners to fail. It accommodates one to sixty individual learners and can be easily adjusted to particular classroom settings by a "learning manager" (a teacher or parent). Use Edu-Ware data diskettes or build your own.
48K, Applesoft, DOS 3.2 or 3.3 $29.95
Data Diskettes (grade levels 4, 5, 6, 7, 8, and Adult Secretarial available) $19.95.

. . . that classroom is available in your home today.

EDU-WARE®
The Science of Learning™

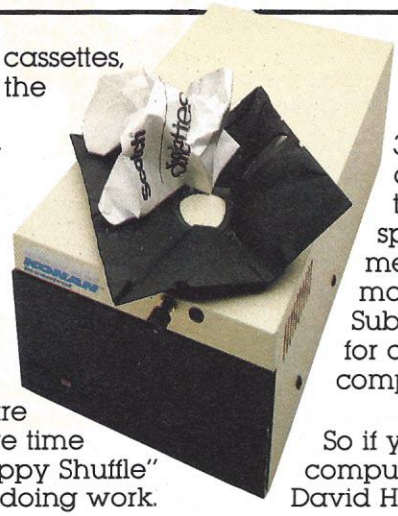
Available at computer stores everywhere.
Dealer inquiries welcome.

Edu-Ware Services, Inc., P.O. Box 22222, Agoura, CA 91301 (213) 346-6783

CIRCLE 42

Stop the Floppy Shuffle

Announcing
The David Hard Disk Subsystem



Compared to cassettes, floppies were the greatest thing since integrated chip. But with increased applications, data bases, and speed requirements, a lot of business people are spending more time doing the "Floppy Shuffle" and less time doing work.

Now with Konan's David Hard Disk Subsystem you can have 32 times the storage of a mini-floppy in about the same amount of space. At a cost per megabyte that really makes sense, the David Subsystem is available for a variety of microcomputers.

So if you own a personal computer, check into the David Hard Disk Subsystem at your local dealer and stop doing the Floppy Shuffle. And if you want real timesharing capabilities, a networking card is available.

The David Subsystem is available immediately.

Toll-free Information Line

800-528-4563

KONAN™

KONAN CORPORATION
1448 NORTH 27TH AVE, PHOENIX, AZ 85009
(602) 269-2649, TWX/TELEX 9109511552

CIRCLE 69

OUTLOOK

continued from page 16

tangible medium." However, most copyright speakers advised the audience to register their computer programs with the Copyright Office to obtain *prima facie* evidence of the date the work was created and the contents of the work itself. If you have registered your program with the Copyright Office before someone infringes your copyright, you can request statutory damages and attorney's fees.

Speakers debated the advisability of submitting software in source-object-code form. If only object code is submitted, the Copyright Office delays registration and requests a copy of the source code. If the registrant refuses to submit a copy of the source code, the Copyright Office proceeds with registration of the object code, "under the rule of doubt," if the registrant sends a letter substantiating that the object code represents a work of authorship. Some speakers said registration under the rule of doubt might cast doubt upon the validity of the copyright registration.

Some speakers in private practice said they would not advise their clients to submit programs in source code. Their concern—source code can be copied—was somewhat allayed when a Copyright Office spokesman said programs are stored with other works and are not indexed as programs. So a would-be copier must know the author's name, the title of the work, the name of the copyright claimant or the registration number of a program to request a copy of the work. If the author is a software house, it could be relatively easy to identify computer programs. But Joe Smith is not easy to identify as a computer programmer.

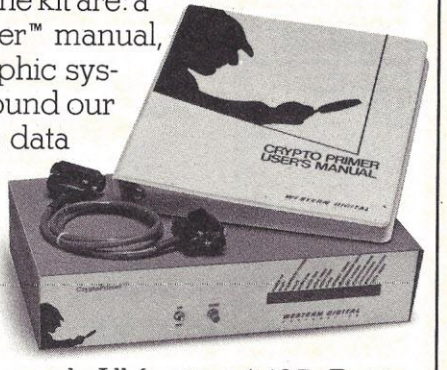
The Patent Office encouraged attorneys to apply for patents if the software transforms or reduces an article to a different state or thing, but the office also reminded attorneys that software must be novel and meet other criteria to be patentable.

Trade-secret law offers the best protection for software, according to Roger Milgrim, author of *Milgrim on Trade Secrets*. Any information used in a trade or business in secrecy that is not generally known and that is useful in competition can be a trade secret. Computer software can be a trade secret if one takes reasonable measures to keep the program code and documentation secret. Such measures include restrictive covenants against disclosure in employment agreements, guards at offices, logs recording the location of protected documents at any given time and safes to store copies of documentation and programs.

Milgrim warned, though, that the government

Unwrap the Crypto Mystery for $495.

Thanks to the Western Digital CryptoPrimer™ Development Kit, cryptography is no longer a deep, dark secret. In fact, the kit is specially designed for personal computer owners and is based on the National Bureau of Standards' data encryption algorithm. Included in the kit are: a CryptoPrimer™ manual, a cryptographic system built around our WD 2001/2 data encryption chip, a convenient RS 232 connector and a special hardware manual. All for just $495. Best of all, you'll end up with more than a clue on how to implement all the benefits of data encryption. So send your check or money order (including $9.00 for shipping and 6% sales tax if you're a California resident) to: Western Digital, 2445 McCabe Way, Irvine, CA 92714. Please also specify your computer's make and model number.



We think keeping cryptography a mystery is a crime.

Making the leading edge work for you.

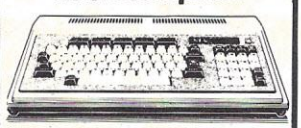
WESTERN DIGITAL
CORPORATION

Telecommunications Division
2445 McCabe Way, Irvine, CA 92714
(714) 557-3550

CIRCLE 55

ORDER TOLL-FREE
consumer computers Mail Order DISCOUNTS
FREE SHIPPING*

NEC
Microcomputer



CALL FOR BEST PRICE

apple computer
Authorized Dealer

CALL FOR BEST PRICE
DISK DRIVES AVAILABLE

NOW SELLING ZENITH XEROX
CALL FOR PRICES
COMING SOON! OSBORNE

MORE DISCOUNT PRICES

16K RamBoard by ConComp Industries	130	Joystick II by Keyboard Co	45	VisiTerm	129
Silentype Printer w/interface card	349	Music System (16 voices)	479	WordStar (Apple 80 col. version)	249
Hayes Micromodem II	299	CPS Multi-function card	189	Dow Jones Portfolio Evaluator	45
Novation Apple-Cat	339	Sup-R-Terminal 80 column cards by M&R	329	Apple Writer	65
Videx Videoterm 80 column card	269	We carry all California Computer		Apple DOS Toolkit	65
Z-80 Softcard by Microsoft	299	System Cards	CALL	Apple Plot	60
16K RamCard by Microsoft	169	VisiCalc version 3.3	159	Tax Preparer	99
Graphics Tablet	619	VisiFile (NEW data base manager)	199	Real Estate Analyzer	129
Thunderclock Plus clock/calendar	119	VisiTrend/VisiPlot	219	Personal Filing System (PSF)	85
23 Key Numeric Keypad by Keyboard Co.	120	VisiDex	159	Systems Plus Accting Software	CALL

PRINTERS

Anadex 9501 w/2K Buffer	1349
C. Itoh Starwriter 25 CPS daisywheel	1449
C. Itoh Starwriter 45 CPS daisywheel	1649
Epson MX-70	CALL
Epson MX-80 & MX-80 F/T	CALL
Epson MX-100	CALL
NEC 8023 Impact Dot Matrix	695
NEC Spinwriters (Latest models)	CALL
Paper Tiger IDS-445G w/graphics	699
Paper Tiger IDS-460G w/graphics	949
Paper Tiger IDS-560G w/graphics	1249
Silentype Printer w/Apple interface	349
Qume Sprint Daisywheels (Latest models)	CALL
Diablo 630 Daisywheel 40 CPS	1795

ORDER TOLL-FREE
800
854-6654
in California and outside U.S.
(714) 698-8088

MONITORS

Amdek/Leedex Video 100 12" B&W	155
Amdek/Leedex Video 100G 12" Green Phosphor	179
Amdek (Hitachi) 13" Color w/audio output	179
NEC 12" Green Phosphor Display JB-1201M	CALL
NEC 12" Lo-Res Color Display	CALL
NEC 12" Hi-Res RGB Color Display	CALL
Sanyo 9" B&W Display	185
Sanyo 9" Green Phosphor Display	CALL
Sanyo 12" B&W Display	269
Sanyo 12" Green Phosphor Display	285
Sanyo 13" Color Display	449
Zenith 12" Green Phosphor Display ZVM-121	149

CALL FOR BEST PRICE

commodore
CBM
Business computer
CALL FOR BEST PRICE

commodore
PET
Personal computer
CALL FOR BEST PRICE

DISK DRIVES AVAILABLE SOON!

VIC-20 PERSONAL COMPUTER
$259
• color • sound • graphics

WE STOCK 1000S OF HARDWARE AND SOFTWARE ITEMS, PLEASE WRITE OR CALL FOR LIST

consumer computers
Mail Order
8314 PARKWAY DR.
LA MESA, CA 92041

Ordering Information: Phone orders using VISA, MASTERCARD, AMERICAN EXPRESS, DINER'S CLUB, CARTE BLANCHE, bank wire transfer, cashier's or certified check, money order or personal check (allow ten days to clear). Unless prepaid with cash, please add 5% for shipping, handling and insurance. (minimum 5.00). California residents add 6% sales tax. Institutions and corporations please send for a written quotation. All equipment is subject to price change and availability without notice. All equipment is new and complete with manufacturer's warranty (usually 90 days). Showroom prices may differ from mail order prices.

CIRCLE 44

can disclose software to persons who request it under the Freedom of Information Act, and that one should be careful to limit disclosure of program source code and documentation or to provide adequate relief in the government contract for damaging disclosures.

Computers help students get shot

Remember record-keeping in the school you attended? At the beginning of each school year, you'd see platoons of kids helping a few frazzled administrative workers to assemble and reassemble student records.

Times have changed. One example of such a change comes from West Side High School in Manhattan where Norma Lugo, an educational assistant, gets kids shot. Lugo had been informed that New York State's Department of Health wanted all students who had not been immunized out of the schools.

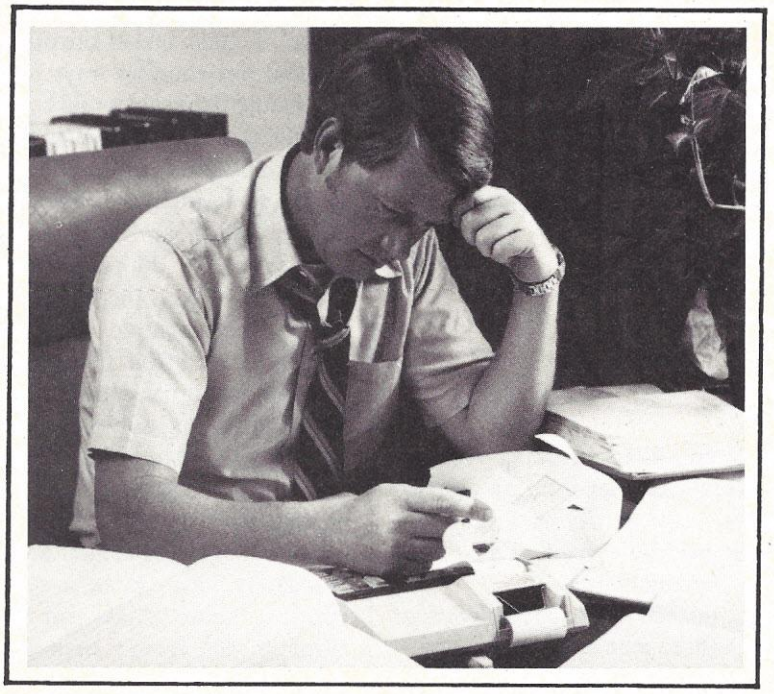
Unlike many other schools in the city, West Side used Commodore computers with Jinsam data-base management software from the Riverdale, N.Y.-based Jini Micro-Systems. These helped school administrators find those students who had not been immunized.

Each New York school had to go through each student's records, assess each student's immunization history, inform students as to the shots they needed and when, and then produce reports. These reports were produced by class for teachers, by grade for counselors and by school for principals and boards of education. Special reports for county and state educational and health organizations were also compiled.

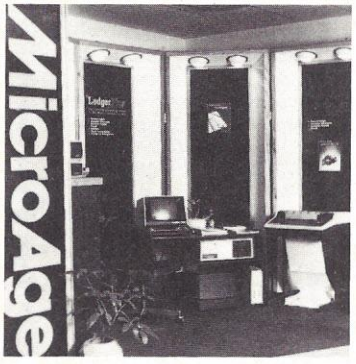
Lugo says that it took her and an assistant only two weeks to complete these tasks. She also says that a larger school in New York took two months to complete the job, and that was using six people. After the reports were presented, they were rejected and a staff was hired to do them again this summer.

Using the computer, Lugo added information as it came in, and the data-base program integrated it into current records. But Lugo couldn't just push a button and generate the needed data. A code had to be designed for new information, and space had to be added to the existing Jinsam student data base. The data base could then collect student's shot records, and feed appropriate information to the

CASH FLOW PROBLEMS?



IT'S NICE TO KNOW SOMEONE WHO HAS THE SOLUTION.



MicroAge is your Solution Store . . . that means at MicroAge Computer Stores we have a wide selection of time-saving computerized business systems designed specifically to solve the daily cash flow problems every businessman faces.

MicroAge has computerized business systems that quickly and affordably allow you to regain control of your critical accounts receivable . . . at last making it possible for you to carry out effective collection procedures on a consistent basis. MicroAge has accounts receivable program packages to automatically display and update account information; prepare trial balance including a balance-due and delinquency aging report, and take care of dozens of other tasks that eat into your time and profit!

Computerized business systems from the MicroAge Computer Store are available in the $5,000 to $15,000 range, to suit the individual budget of your small business or professional practice. MicroAge backs up every system with personalized service, warranty service and repair, installation, systems consulting, even customer training. Visit the MicroAge Computer Store in your area soon with your business problems, and let us help you with the solution.

MicroAge®
COMPUTER STORE
"The Solution Store"

VISIT THE STORE IN YOUR AREA:

El Paso, Texas (915) 591-3349
Rockville, Maryland (301) 762-7585
Tucson, Arizona (602) 790-8959
Albuquerque, New Mexico (505) 883-0955
Pleasant Hill, California (415) 680-1489
Aurora, Colorado (303) 696-6950
Rochester, New York (716) 244-9000
Hurst, Texas (817) 284-3413
Salina, Kansas (913) 823-7596
Orland Park, Illinois (312) 349-8080
Milwaukee, Wisconsin (414) 257-1100
Mountain View, California (415) 964-7063
Scottsdale, Arizona (602) 941-8794
Anchorage, Alaska (907) 279-6688
San Diego, California (714) 278-0623
Richardson, Texas (214) 234-5955
Minneapolis, Minnesota (612) 338-1777
Omaha, Nebraska (402) 339-7441
Phoenix, Arizona (602) 265-0065
Columbus, Ohio (614) 868-1550
Indianapolis, Indiana (317) 849-5161
Portland, Oregon (503) 256-4713
Norwalk, Conneticut (203) 846-0851
St. Louis, Missouri (314) 567-7644
Oklahoma City, Oklahoma (405) 728-1837
Houston, Texas (713) 440-7547
W. Palm Beach, Florida (305) 683-5779
Toronto, Canada (416) 487-5551
Houston, Texas (713) 270-9647
Wilmington, Delaware (302) 658-3672
Allentown, Pennsylvania (215) 434-4301

FOR FRANCHISE OPPORTUNITIES CALL (602) 968-3168

CIRCLE 40

Wordpro word-processing program for follow-up letters to parents.

The data base also had to make adjustments for students with religious exemptions, missing records for new students, and sorting between needs-certain-shots students and unimmunized walking-danger-zone students who had to be taken out of school immediately.

Nonsectarian software

At first sight, it is an unlikely looking software house. It is more like a scene set from an old rustler's cowboy movie—100 gently rolling Texas acres, covered in part by feed crops and grazed on its open shoulder by breeding cows.

In the main house, instead of poachers, live four Catholic lay monks—three men and one woman—who devote most of their day to the words of the gospel. A good deal of the other portion of their day is spent determining ways to make money to feed and clothe themselves and continue the monk's calling. That's where the software comes in.

Actually it was owning the cows that inspired the monks to an interest in high technology. The monastery, known as St. Benedicts' Farm, had kept dairy cows for 20 years through the mid-1970s. During that time the monks began to rely on and become comfortable with computerized records they purchased from the federal Department of Agriculture's Dairy Herd Improvement Program. When the monks sold the dairy cows—they bought a breeding herd in 1978—they took the extra money from the sale and purchased a small Emcie computer system.

"We bought the computer to do a whole range of monastery jobs—to be a secretary, do word processing, keep books and so on," says George Gannon, the farm's manager and abbot, and a

MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS

EDAS 3.5

EDAS is a sophisticated Editor and Assembler for TRS-80 I & III
- All text may be input in upper or lower case.
- Assemble directly from one or more disk files via *GET.
- Assemble to disk or memory
- Binary, octal, decimal, hex, and string constants; Multiple constants may be input on a single line.
- CMDFILE utility included.
- Conditional assembly support.
- Cross-Reference utility.
- DOS functions DIR, FREE, KILL, and LIST are supported.
- 14-character labels including special chars. "@", "$",".","?".
- Editor includes block move, global change, renumber, find.
- EDTASM & M-80 source files can be read or written.
- Expression evaluator supports +, −, *, /, MOD plus logical AND, OR, and XOR.
- Paged & titled listings with page numbers and date/time.
- PAGE, TITLE, SUBTTL, SPACE, & COM pseudo-ops supported.
- Set memory size, page prompt, JCL execution, Abort option.
- EDAS is supported with TRSDOS compatible DOSs (LDOS, VTOS).
- Price is $79.00 + $4.00. S&H.

MISOSYS SERIOUS SOFTWARE

MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS

LDOS, Version 5.1 is the Ultimate in Operating Systems for the TRS-80 Models I and III. MISOSYS is your East Coast Headquarters for LDOS, the documented system! Version 5.1 is priced at $169.00 + $5.00 S&H per system. Deduct $50 if ordering both.

LDOS 5.1

MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS

DSMBLR

Complement your assembly language tools with this Z-80 disassembler which produces screen, printer, cassette, or disk file output. A two pass process provides SYMBOLS for 16-bit address and 8-bit relative references. EQUates & ORG are generated. Read SYSTEM programs & display load address range. $20 (DSMBLR I for non-disk use is $15).

EDAS, CMDFILE, DSMBLR Specify Mod I or III. Add $1 S&H+$.50 per program. VA residents add 4%.

VISA

MISOSYS - Dept. P3
5904 Edgehill Drive,
Alexandria, Virginia 22303
703-960-2998 MicroNET 70140,310
Dealers Inquiry Invited

MasterCard

DISKMOD

Turn your Editor Assembler into a disk package. This 32K patch modifies EDTASM for DOS operation. Features? Add full disk I/O, block move, global change, printer pagination, sorted symbol table, print memory utilization, enhance DEFM expansion, protect memory, and recover after BOOT. From within the EDTASM you will have DIR, KILL, & FREE. Upgrade your EDTASM! $20.

THE BOOKS

THE BOOKs must be a part of your tools. Volume I gives you access to all math operations in your Level II ROM. A symbol table of the entire machine noting over 500 addresses is included. Volume II tells you everything you wanted to know about the level II I/O—printer, keyboard, video, and cassette routines are fully explained. Each volume has a fully commented listing of all the routines discussed. THE BOOKS will save you hours of assembler programming. Each volume is priced at $14.95 or buy both for $24.95. Add $1.50 S&H per book.

MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS MISOSYS

CIRCLE 75

Every Apple Is Created Equal. But It Doesn't Have To Stay That Way.

An Apple™ is really something.

But from now on, it's going to be something much more. How come? Simple. We're introducing three revolutionary new data communication packages, called Transend™, designed especially to make your Apple II™ rise above all others.

Our Transend data communications software provides access to information utilities; complete file transmission of charts, VisiCalc™ reports, and entire programs; as well as all electronic mail functions.

Transend comes in three different versions. You can begin economically with the simplest form, Transend 1, an intelligent terminal/file transfer system. As your needs increase, you can move up to two other Transend packages, without worrying about retraining or repurchasing. Transend 2 gives any Apple II intelligent terminal capabilities, plus file transfer with complete error detection and automatic retransmission for demanding business applications. Transend 3 incorporates electronic mail—with password security, text editing, mailbox with mailstop, unattended scheduling and receiving, automatic redialing, and much more.

SSM

The Transformation People

Transend's support of most popular Apple II "add-in" cards and modems lets you upgrade your Apple without hassle or unnecessary expense. And you'll immediately cut operating costs by as much as 30% with simple, easy-to-use menus, data compression and 1200-baud modem support.

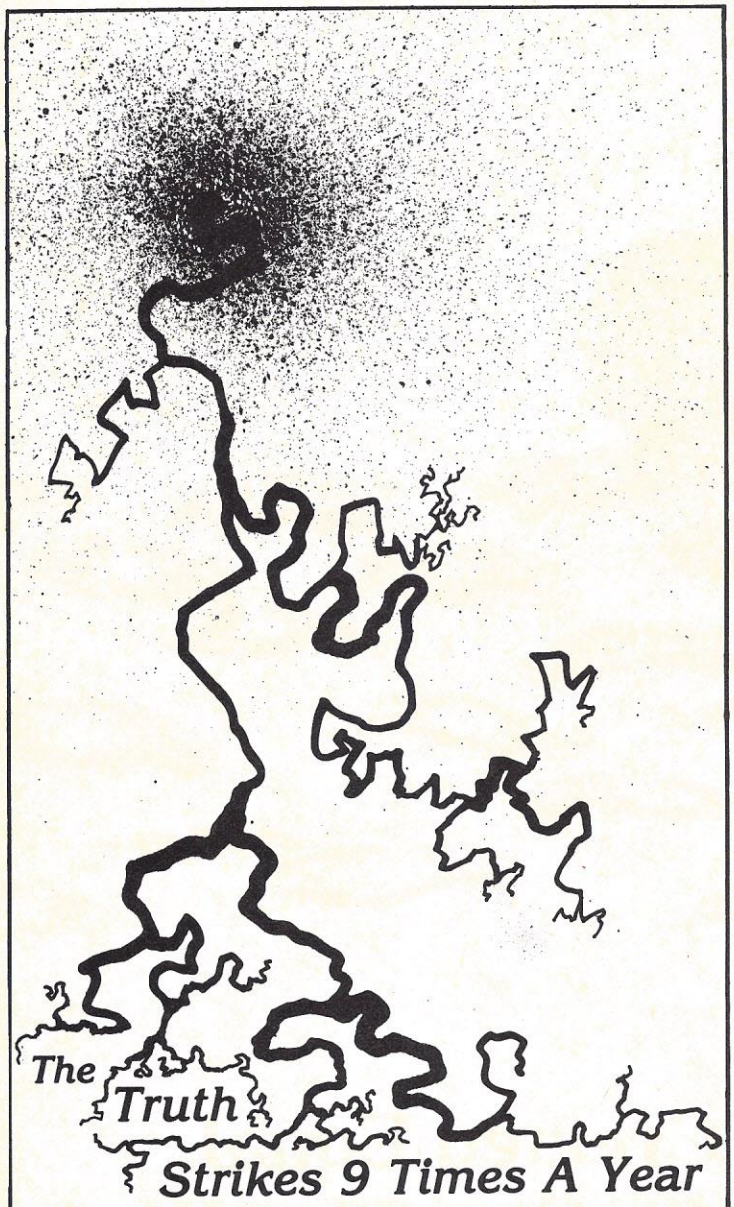
Nobody on the personal computer scene today is offering the speed, flexibility, and reliability of Transend in a single upgradable software system.

Don't miss this chance to uplift your Apple II. Contact us or your dealer for all the delicious details.

SSM Microcomputer Products, Inc., 2190 Paragon Drive, San Jose, CA 95131, (408) 946-7400, Telex: 171171, TWX: 910-338-2077.

Apple and Apple II are trademarks of Apple Computer, Inc. VisiCalc is a trademark of Personal Software, Inc. And Transend is a trademark of SSM Microcomputer Products, Inc.

CIRCLE 49



HAVE YOU READ PEELINGS II ?

Entering its third year, Peelings II is widely respected in its field. It is a special magazine which evaluates Apple II software. We review all kinds of software, from cover to cover.

Our reviews are sometimes humorous, occasionally blistering, but always honest, informative and to the point.

Subscribe Now. Our promise is the Truth, nine times a year. You can't go wrong. (Money-back guarantee, of course.)

PEELINGS II
Dept. P
P.O. Box 188
Las Cruces, N.M. 88004
(505) 526-8364

One year (9 issues)
$21.00/U.S.—$28.50/Canada, Mexico
$44.00/Foreign

CIRCLE 36

OUTLOOK

founder of St. Benedict's 26 years ago. "Then I learned programming—in those days you had to write practically all your own software—and the next obvious step was to develop a program for managing our new breeding cattle."

After the program, called Beefup, was written, the decision to try to market it was a natural one for the monks. The monastery has a habit of squandering none of the talent of its members. The monks have merchandised themselves as wedding photographers, audio technicians, songwriters, movie makers and other diverse specialities—and now they're software providers. They followed Beefup with a second program called Pedigree, for annotating the family history of livestock.

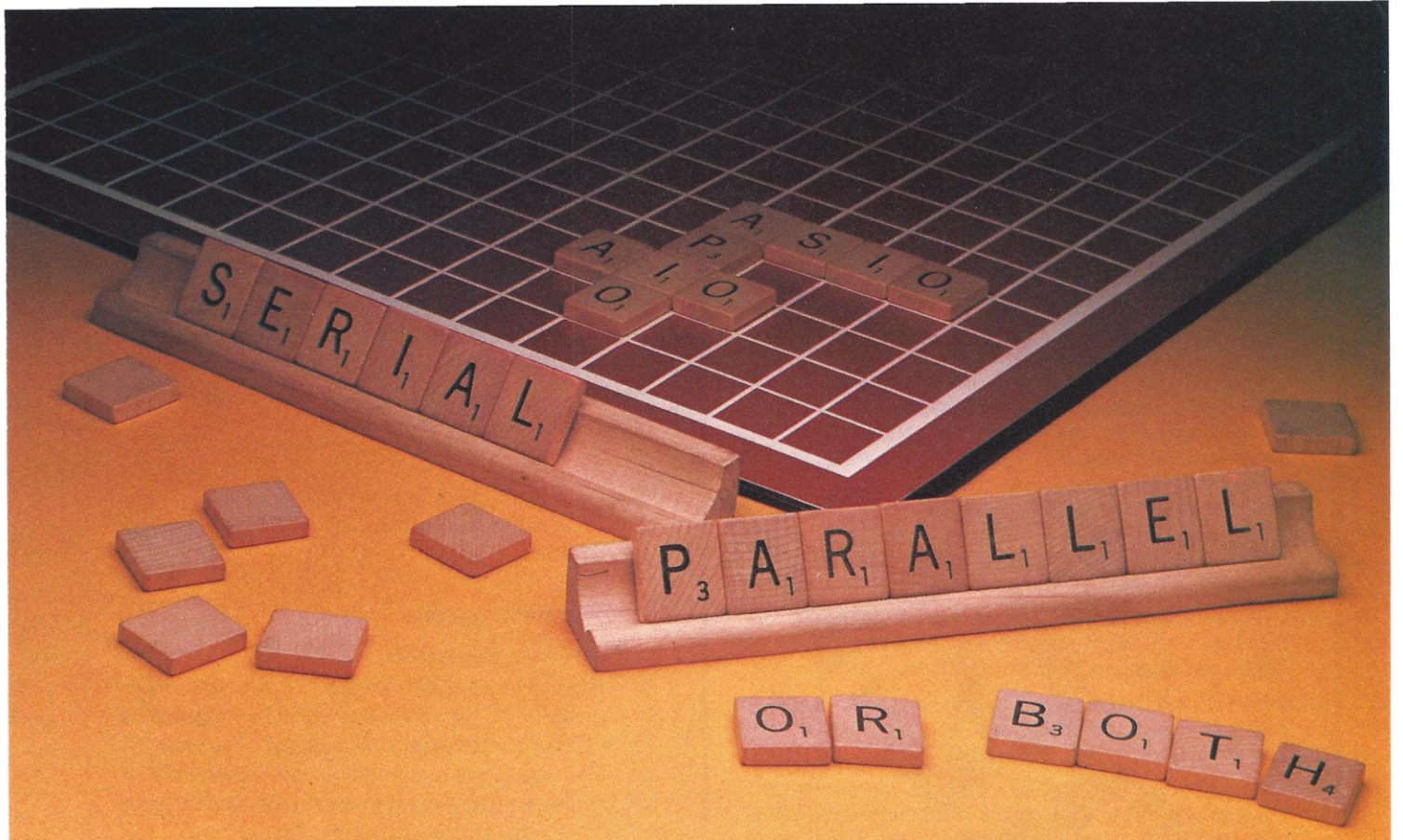
While customers for the animal husbandry programs have not beaten a path to the monastery with the persistence of stampeding cattle, the monks expect this to change when they hook into an adequate distribution chain for the software, something they hope to accomplish in the near future.

Beefup, which can be used by both commercial beef-cattle producers as well as purebreed breeders, provides a manageable list of cow and calf performance data. The program covers nine data listings including a cow's lifetime report (age, number of calves she had at last mating, which bull was used as stud, weight of calves at birth, pregnancy check dates, etc.), nursing information and a performance list of the calves (weaning dates, birth date, sire, etc.). The program keeps track of as many as 999 cows. Field entries are kept simple—ID numbers and weights, "Y" for an affirmative pregnancy check and so on.

Beefup, with a manual, costs $500 and comes on an 8-inch single-density floppy disk.

The other program developed by St. Benedict's, Pedigree, maintains and constructs up to five-generation annotated pedigrees of any type of livestock. Breeders can realize two kinds of advantages from this program. First, the information furnished by Pedigree helps in the planning of matings and refreshes a breeder's memory as to the ancestry of any animal in the herd. Secondly, Pedigree is a sales tool. Using a printout, the breeder can show prospective buyers a complete pedigree of any animal he is comtemplating purchasing, and this printout can immediately be given to the buyer, even before official papers are processed.

Pedigree also offers an additional advantage for the breeder manager: With this program it is possible to explode a pedigree line into the future and



The New AIO-II.

Another winner from the folks who invented multi-function Apple interfaces.

SSM is still ahead of the game when it comes to the Apple II.™ Choose from any of four operating modes. And you're assured of flexibility at a price that spells big savings.

Check out why SSM spells success:

THE NEW SERIAL/PARALLEL AIO-II: this new full-function serial and parallel interface for the Apple II gives you true simultaneous operation. It's totally transparent to the user; there's no software to write, and no need to modify your computer. Advanced design techniques overcome the need for "phantom" slot assignments and related software compatibility concerns.

The AIO-II™ appears to application software as either an Apple communications card or parallel printer card. You don't have to worry about special setup requirements. Hassle-free, user-oriented AIO-II design permits easy selection of four functions: serial modem, serial terminal/printer, parallel Centronics printer, and general-purpose parallel. On-board firmware provides all necessary drivers in a single package. Optional cables support Centronics-compatible printers and others.

You can remain in the game, too, with either our Serial ASIO™ or Parallel APIO™ boards—if low cost, single function's your style. Our ASIO connects your Apple to a modem with an optional terminal routine, or to a terminal/printer without modifying the cable. It gives you standard RS-232 interface with complete handshaking. And selectable rates from 110 to 9600 baud. The APIO parallel interface supports general-purpose I/O and all popular Centronics-compatible printers, including Epson, IDS, Okidata, Anadex, and others.

All our game-winning boards are designed to make your Apple more productive. Optional software support is available for Apple Pascal and Microsoft CP/M.™

Whether you're an OEM or end user, we can deliver any quantity you specify. Fast. For the latest word on any of these interface boards, or our newly enhanced A488™ (the industry's highest performance IEEE-488 controller), see your local dealer, or call us today.

SSM Microcomputer Products, Inc., 2190 Paragon Drive, San Jose, CA 95131, (408) 946-7400, Telex: 171171, TWX: 910-338-2077.

SSM

The Transformation People

CIRCLE 50

Apple and Apple II are trademarks of Apple Computer, Inc. CP/M is a trademark of Digital Research. AIO-II, ASIO, APIO and A488 are trademarks of SSM Microcomputer Products, Inc.

$199.50 up

NOW—A MODEM AND MUCH, MUCH MORE!

SMART SERIES SOFTWARE

All terminal programs feature manual or automatic upload/download, two user-defined messages, auto prompt message entry, transfers EDTASM and Orchestra-80 files, formats screen line length, file transfer speed selection, upper/lower case drivers, auto-repeat key, "beep" function for keystroke entry, buffered print output, compatible with SCRIPSIT and PENCIL. Comes with text generator for those who do not have a word processor.

SMART 80D (disk)—$29.95 purchased alone or FREE★
Requires Model I 32K plus one disk drive. Available for both RS232 and Buss-decoding MICROCONNECTION.™

SMART 80C (cassette)—$29.95 purchased alone or FREE★
Requires Level II 16K-48K system. Available for both RS232 and Buss-decoding MICROCONNECTION.™

SMART 80E (wafer)—$29.95 purchased alone or FREE★
The first and only smart terminal program for the EXATRON "Stringy Floppy." Requires Level II 16K plus one ESF drive.

SMART IIID (disk)—$49.95 purchased alone or $20.00 with purchase of MICROCONNECTION.
The FIRST smart terminal program for the Model III. Offers popular features of SMART 80D plus several new features associated with the Model III. Requires Model III 32K plus one disk drive and RS232 board.

SMART IIIC (cassette)—$29.95 purchased alone or FREE★
The FIRST cassette-based smart terminal program for the Model III. All the power of SMART 80C plus numerous other features. Requires Model III Level II 16K plus RS232 board.

AUTOTERM—The ultimate TRS-80☆ terminal package that exploits the full capabilities of your computer and the MICROCONNECTION™ with Autodial/Autoanswer. It has ALL the features of the "other" smart terminal programs, plus:

- Dials MICROCONNECTION™ from terminal
- Allows full I/O translation
- Complete modem control and handshaking
- Paged screen scrolling
- Spooled printer output
- Parity, overrun and framing errors status
- Fully user-configurable
- Includes 77-page manual
- Text editor and hex conversion utilities
- Requires TRS-80 Model I or III, 32K and 1 disk drive
- Price—$99.50. Documentation alone—$15.00

★One software package included with the purchase of each MICROCONNECTION.™
MICROCONNECTION™ prices start at $199.50.
☆Trademark of the Tandy Corp.

the microperipheral corporation

2643 151st Pl. NE
Redmond, WA 98052
206/881-7544

master charge
VISA

CIRCLE 46

OUTLOOK

forecast the coming generational lines of the animal.

Pedigree, with a manual, costs $300 and also comes on an 8-inch single-density floppy disk.

More information can be obtained from St. Benedict's Farm, Box 366, Waelder, Texas 78959; (512) 540-4814.

The cable connection

Margo Downing-Faircloth

Television, the irreverent electronic invention that has been on a roller coaster of praise and rejection since the 1920s, may once again be regarded as more than an entertainment medium. The alternative this time is not as limited as educational TV, a continuously struggling industry dependent almost entirely on donations and public funds.

What is about to unfold is purely commercial, but has the potential to radically change the way Americans, think, work, learn, buy, sell and communicate. Families throughout the nation will soon be able to view banking transactions, do comparative shopping, read articles from newspapers and magazines and read mail—all on their television sets. And they will even be able to converse with people all around the country.They will be able to see their budgeting on the television, actually turning the TV into the display part of a computer terminal.

The ability to do these things is now available primarily to personal-computer users. But by next year in the Philadelphia area, and as early as January on the West Coast, that privilege will be open to anyone who subscribes to cable television.

So many cable companies are interested in making these services available that industry experts now say the potential market is at least 23 million households.

Cable subscribers in Park Cities, Texas, already use their televisions to retrieve information such as the latest stock-market reports, financial reports in the *Wall Street Journal* and updated Dow Jones averages. Cable subscribers in Park Cities can also read the latest weather reports and stories about sports, says Richard Levine, editorial director for the Dow Jones News Retrieval Service based in Princeton, N.J.

Levine says that those subscribers will also have access to an encyclopedia which will be updated regularly, a local newspaper and several other infor-

New from NRI! The first at-home training in videocassette recorder repair with exclusive videotaped lessons.

Learn Video/Audio Servicing... includes RCA state-of-the-art VCR, NRI Action Video lessons, plus full training in color TV and audio repair.

Now, you can learn the hottest, most wanted skill in home entertainment electronics... servicing and repairing videocassette recorders and video disc players. Well over 2 million units have already been sold and the demand is just starting! Already, qualified VCR technicians are in short supply... people are waiting up to a month for VCR repair. Good jobs at good pay are going begging.

Choice of Specialized Training

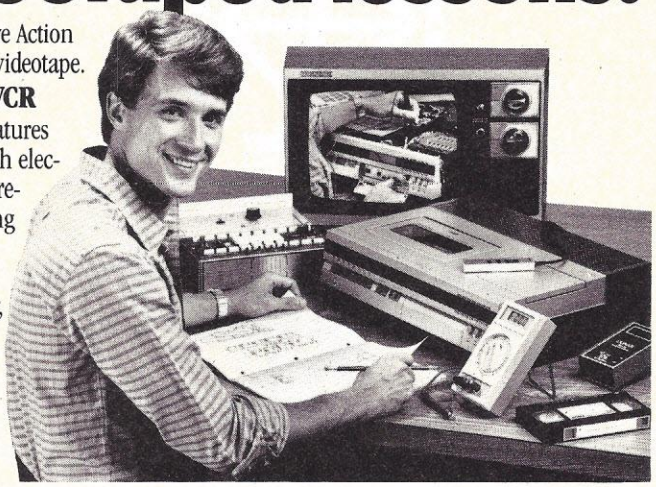
NRI offers you three Master Courses in Video/Audio Servicing, each complete, each with equipment and training for the specialty you want. Each course thoroughly prepares you for color TV plus audio and video equipment. Then, you take the specialized hands-on training on the equipment you select.

You can get specialized audio experience as you build your own AM/FM stereo system complete with speakers. Or gain real bench experience with hands-on TV training as you build a 25" (diagonal) fully-computerized, programmable color TV and professional test instruments. Or train with your own RCA videocassette recorder and NRI's exclusive Action Video servicing lessons on videotape.

Learn as you work with equipment you keep.

State-of-the-Art VCR

This modern VCR features high-technology design with electronic pushbutton tuning, remote control, three recording speeds with up to 6-hour capacity, high-speed visual search, built-in clock/timer, memory rewind and audio dubbing capability.



It's yours to keep, as part of your training. You'll not only use it to learn operation and servicing techniques, but to play the absorbing NRI Action Video lessons that come as part of your specialized training. In word and picture, you'll learn theory, construction, and service procedures, see them explained in graphic closeups.

Learn at Home at Your Convenience

No need to quit your job or tie up your evenings at night school. NRI comes to you. You are a class of one, getting both theory and practical hands-on training backed up by our staff of experienced educators.

NRI the Pros' Choice

More than 67 years and a million and a half students later, NRI is still the first choice in home-study schools. A national survey of successful TV repairmen shows that more than half have had home-study training, and among them, it's NRI 3 to 1 over any other school.

That's because you can't beat the training and value. Only NRI combines exclusive fast-track training techniques with modern state-of-the-art equipment to give you the skills you need for success quickly and easily. Only NRI offers such complete training with so many timely options for specialized bench experience.

Free Catalog... No Salesman Will Call

Mail the coupon today for your free copy of our 100-page look into tomorrow. It shows all the equipment you get, describes each lesson in detail. And it tells you about other important career opportunities in Microcomputers and Microprocessors, Digital and Communications Electronics, Electronic Design Technology, and more. Send today and get started on a big new future for yourself. If coupon has been removed, please write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.

NRI McGraw-Hill

NRI SCHOOLS
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue,
Washington, D.C. 20016
We'll give you tomorrow.

NO SALESMAN WILL CALL

All career courses approved under GI bill.
☐ Check for details

Please check for one free catalog only.

- ☐ Color TV, Audio, and Video System Servicing
- ☐ Computer Electronics including Microcomputers
- ☐ Electronics Design Technology
- ☐ Digital Electronics
- ☐ Communications Electronics • FCC Licenses • Mobile CB • Aircraft • Marine
- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration, & Solar Technology
- ☐ Building Construction

Name (Please Print) Age

Street

City/State/Zip

Accredited by the Accrediting Commission of the National Home Study Council

173-022

Free Intercourse.

We encourage communication.

Expand the use of your Data Factory, Invoice Factory or Visicalc. Enjoy the freedom of moving your data from one program to another; the information and knowledge available to you will grow. Priced as follows: Visifactory $75, Merger $50, Visiblend $50. See these programs at your Micro Lab dealer today.

2310 Skokie Valley Road • Highland Park, IL 60035
312-433-7550

© 1981, Micro Lab, Inc.

* ©1981 PERSONAL SOFTWARE
Apple is a trademark of Apple Computers, Inc.

CIRCLE 48

OUTLOOK

mation sources. Dow Jones, one of several information utilities, was the first to make its services available over cable television. Other information utilities involved in the cable connection are CompuServe, based in Columbus, Ohio, and The Source, with home offices in Charlotte, N.C.

The Dow Jones service is presently the most expensive, but plans are underway to bring the cost down to a $12 monthly fee for unlimited use of its major data bases, Levine says. He also says that currently one of the least expensive rates is the leisure rate for home users at $12 hour.

Comcast Corporation's cable communications division recently entered into an agreement with CompuServe to provide many of the network's services to the 185,000 subscribers nationwide. For about $150, most information services provided by CompuServe will be available on a test basis to cable subscribers in the suburban Philadelphia area, according to Thomas J. Polis, Comcast's vice president for systems development.

Although Polis says a minimal flat fee will be added to monthly cable bills for the service, he says he is not certain what the rates will be, because they are still being negotiated.

For the present, information from CompuServe can be received only by a computer via a phone line. An inexpensive modem already exists in this instance to convert the electronic impulses sent from CompuServe's computers through the phone lines into something readable on the computer screen.

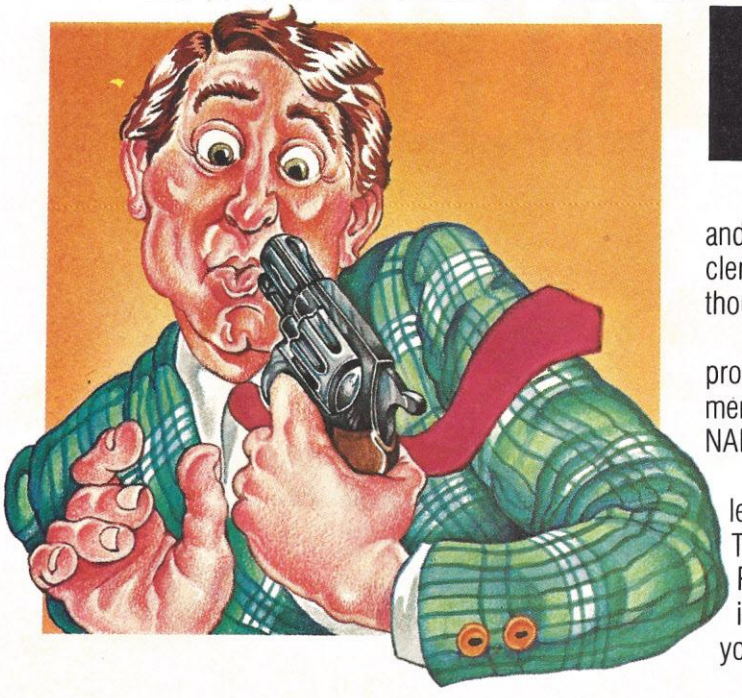
The cost of these computers ranges from $500 to about $2000, with additional costs of up to $350 for the modem and from $4.25 to $25 for each hour of use, depending on the time of day.

But industry observers predict that more people will be able to afford this access to information: "It will open the doors to the mass market," says Al Keener, national accounts manager for CompuServe.

The services offered by Dow Jones and The Source are different from CompuServe's, because the communication is one-way, according to Tom Hawley, director of cable services for The Source. "We're suggesting to cable operators that a finite number of screens or pages of information, ranging from 100 to 5000 pages, be pumped into a continually rotating mode down the cable," he says.

Hawley says The Source will eventually go "two-way," but a larger keypad with letters and numbers will be required. He says the cost to the subscriber for the one-way system will range between $3 and $7 a month. That cost will be added to the monthly cable television bill.

STOP STEALING FROM YOUR OWN BUSINESS



Here's the white collar crime of 1981: Let your people labor away for hours at jobs a properly trained computer can do in seconds.

You **pay** for all those wasted hours.

And you're **missing opportunities**, because the hours could be spent on new, productive, profitable projects.

We can help you.

If you have a CP/M®-based microcomputer, SSG's Business Productivity Packages will scoop up all those hours you're losing and give you back more productivity, more time, more information, and more success.

ANALYST. $250. An information storage and retrieval (data base) system that will replace piles of files with information you can USE.

MAGIC WORKSHEET. $250. SSG's answer to the world's demand for electronic spreadsheet calculation and "what-if" capabilities on CP/M systems. (Available quarter two 1981.)

NAD Name and Address. $100. A mailing and addressing system to do all the typing and clerical work on lists—from ten names to ten thousand.

LETTERIGHT. $200. A correspondence processing package that speeds letter writing AND merges your letters with names selected from your NAD list.

It takes very few hours at today's salary levels to repay the cost of any of these systems. They'll do you far better than that. SSG's Productivity Software Packages will contribute immediately to the growth and success of your business.

Please act now. **Tear out this page.** This coupon or a phone call will get you immediate relief from the white collar crime of 1981. We'll send you complete information. Or better still, answer your questions **immediately.**

Time's a-wasting. That's a crime.

☐ Please rush me information on the SSG Business Productivity Packages for CP/M-based computers.

☐ Please call me right away.

Name _____

Company _____

Address _____

City State Zip _____

Telephone ( ) _____

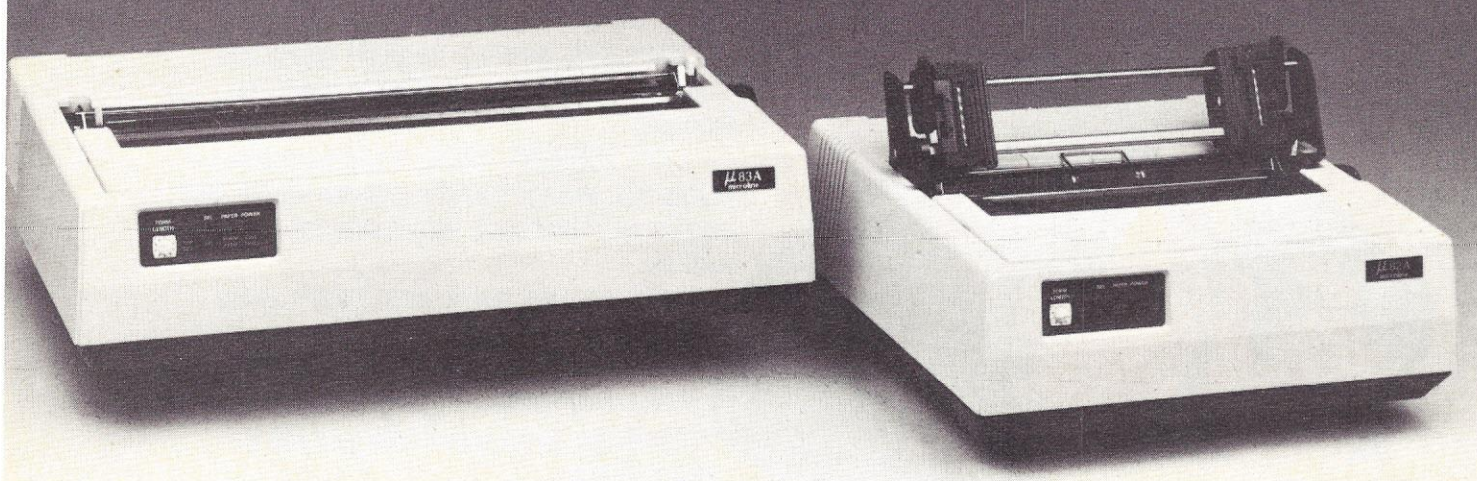
CP/M is a registered trademark of Digital Research. NAD, Magic Worksheet are trademarks of SSG.

Structured Systems Group INCORPORATED

5204 Claremont, Oakland, California 94618 (415) 547 1567

CIRCLE 47

A New Era for Okidata



Models 82A, 83A & 84A from ASAP

OKIDATA's new printer line represents a breakthrough in economical, quality printing. These new printers have more options and features than any previous OKIDATA printer. Faster print speed and throughput, full 96-character ASCII, and both Centronics and RS232C interfaces standard, all at an affordable price. These models are ideal for home or business, personal or educational applications. And now, ASAP is offering these new printers at prices you won't want to miss. Compare the features below. Then call ASAP to order your OKIDATA printer today.

Features	**Okidata 82A** **80 Column Printer**	**Okidata 83A** **136 Column Printer**	**Okidata 84A** **136 Column Printer**
Print speed	120 characters per second	120 characters per second	200 characters per second
Throughput @80 char./line	76 lines per minute	76 lines per minute	114 lines per minute
Print technique	Bidirectional	Bidirectional	Bidirectional
Dot matrix	9 x 9	9 x 9	9 x 9
Character set	Full 96-character ASCII	Full 96-character ASCII	Full 96-character ASCII
Graphics characters	64 block characters	64 block characters	64 block characters
Interface Centronics 8-bit parallel	Standard	Standard	Standard
RS232C (1200 bps)	Standard	Standard	Standard
Size (inches)	14.2W x 12.9D x 5.2H	20.2W x 12.9D x 5.2H	20.2W x 12.9D x 5.2H
Ribbon	Standard typewriter	Standard typewriter	Standard typewriter
Power	100, 115, 220, 240 VAC 50 or 60Hz	100, 115, 220, 240 VAC 50 or 60Hz	100, 115, 220, 240 VAC 50 or 60Hz
Two New Features			
2K Serial bufferboard (RS232)	Optional	Optional	Optional
Okigraph, HI-RES Graphics 72 vert. x 72 horiz. dots/inch	Optional	Optional	Optional

We'll "drive" you wild with our variety of quality disk drives.

ASAP carries only the highest quality floppy disk drives, to provide you with years of trouble-free service and superior performance.

Data Trak™ 5 (ANSI 5¼" compatibility) ..... Call for price
Data Trak™ 8 (IBM compatibility) ..... Call for price
Model 801 (standard floppy) $400.00
Model 850 ..... $640.00
Dual Disk Drive Cabinet $225.00

ASAP also provides a full line of high reliability disk drive subsystems*.

HDC8/1-HD — Cabinet with (1) Priam 10 megabyte hard disk drive with Microbyte Controller ..... Call for price
HDC8/1F+1HD — Cabinet with (1) Qume® DT-8 double-sided double-density drive, and (1) Priam 10 megabyte hard disk drive with Microbyte Controller ..... Call for price
CAB5V — Single cabinet for either Shugart or Qume 5¼", floppy disk drives (cabinet only) ..... $ 75.00
CAB5V/1Q — Single cabinet with (1) Qume® DT-5, double-sided double-density 5¼" floppy disk drive installed ..... $ 425.00
CAB8H — Dual cabinet for 8" floppy disk drives (horizontal mounting) ..... $ 225.00
CAB8V — Cabinet for 8" floppy disk drives (vertical mounting) ..... $ 265.00
CAB8H/V+1S — Dual cabinet with (1) Shugart SA801R installed (horizontal or vertical mounting) ..... $ 695.00
CAB8H/V+2S — Dual cabinet with (2) Shugart SA801R's installed (horizontal or vertical mounting) $1095.00
CAB8H/V+1Q — Dual cabinet with (1) Qume® DT-8 double-sided double-density drive installed (horizontal or vertical mounting) ..... $ 775.00
CABH/V+2Q — Dual cabinet with (2) Qume® DT-8's double-sided double-density drive installed (horizontal or vertical mounting) $1275.00
X5 — Cabinet for desk top mainframe (small power supply) ..... $ 200.00
800D — Cabinet for desk top mainframe (standard power supply) ..... $ 255.00

*All cabinets come complete with power supply, fan and internal cables.

Systems With Spice from California Computer Systems

Spice up your S-100 or Apple II™ with system enhancements from ASAP. From motherboards and mainframe cabinets to I/O boards and RAMs, we have the California Computer System product that will give you the added capability you need.

FOR S-100 USERS

32K Static RAM Board — 200 nS RAMs, compatible with Alpha Micro, Cromemco and others. 32K memory divided into 8K blocks. Fully static 2114 RAMs. Assembled and tested.
Part Number 2032C . . . . . Price: $610.00

16K Static RAM Board — 200 nS RAMs, compatible with Alpha Micro, Cromemco and others. 16K memory divided into 4K blocks. Assembled and tested.
Part Number 2116C . . . . . Price: $290.00

64K Dynamic RAM Board — For 8080 and Z80 based S-100 systems. Provides processor-transparent refresh. 200 nS, 4MHz. Supports IMSAI-type front panels. Expandable. Assembled and tested.
Part Number 2065C . . . . . Price: $550.00

Z80A CPU Board — 2 or 4MHz, switch selectable. 158 instructions, including 8080's 78 instructions for total 8080 software compatibility. 2K monitor ROM and RS-232-C port on-board. Assembled and tested.
Part Number 2810A . . . . . Price: $265.00

Floppy Disk Controller — Controls up to four 5¼" and 8" drives in any combination. Double-sided and side-select signals for double-sided drives. Compatible with IBM 3740 and System 34 standards.
Part Number 2422A . . . . . Price: $365.00
*CP/M® Version 2.2 Free With Purchase
* Trademark of Digital Research, Inc.

S-100 Mainframe — 12-slot motherboard. Active termination on all bus lines. Built-in power supply, fan and circuit breaker. "Double path" trace pattern. Solder plated circuit area. Assembled and tested.
Part Number 2200A . . . . . Price: $475.00
2201A (220VAC) $475.00

S-100 Motherboard — 12-slot capacity using standard S-100 connectors. Capable of supporting CPU's at 4MHz and above. "Double path" trace pattern. On-board voltage regulator.
Part Number 2501A . . . . . Price: $150.00

4-Port Serial I/O Interface — 4 individually-controlled asynchronous ports. Fully buffered inputs and outputs. Includes ROM circuitry for 2716 2K EPROM (user supplied). Ports meet RS-232-C interface specs. 3 control and 3 status registers per port.
Part Number 2710A . . . . . Price: $275.00

2-Serial, 2-Parallel I/O Board — Fully buffered inputs and outputs. Includes ROM circuitry for 2716 2K EPROM (user supplied). Parallel ports have full four-line-per-port handshaking and 8-bit data transfer. Serial ports meet RS-232-C interface specs. Port A transmits and receives in asynchronous mode; Port B in either synchronous or asynchronous.
Part Number 2719A . . . . . Price: $275.00

4-Port Parallel I/O Board — 3 I/O ports and one output port. Seven bit status register. Fully buffered inputs and outputs. ROM circuitry for 2716 2K EPROM (user supplied). Ports provide 8-bit parallel data transfer; TTL-compatible.
Part Number 2720A . . . . . Price: $195.00

FOR APPLE II™ USERS

Synchronous Serial Interface — Compatible with RS-232-C (configurations A thru E, 1978). Supports full or half duplex. DTC type interface.
Part Number 7712A . . . . . Price: $149.00

Programmable Timer — Time events in continuous, single shot, frequency comparison and pulse width comparison modes. Interface patch area for custom interface applications.
Part Number 7440A . . . . . Price: $ 95.00

Asynchronous Serial Interface — RS-232-C compatible (configurations A thru E, 1978). DCE type interface: supports half or full duplex operation.
Part Number 7710A . . . . . Price: $139.00

Calendar/Clock Module — Accurate, real-time counting. Software programmable for 12-or 24-hour format. Each decimal digit of data is separately addressed for freedom of data format.
Part Number 7424 . . . . . Price: $ 99.00

3¾ Digit BCD A-to-D Converter — Converts DC voltages to BCD numbers for monitoring and analysis. 400 mS per conversion. -3.999 to +3.999 VDC full scale. ±5% non-linearity.
Part Number 7470A . . . . . Price: $ 95.00

12K ROM/PROM Module — Capable of accepting operating systems, system patches or firmware in 2K increments of mixed ROM or PROM. Addressable 12K in any of 4 16K blocks. 2316E ROM and 2716 PROM compatible.
Part Number 7114A . . . . . Price: $ 85.00

Parallel Interface — Two bidirectional 8-bit buses for interface to peripherals. Two programmable control registers. Four individually controlled interrupt input lines, two usable as peripheral control outputs.
Part Number 7720A . . . . . Price: $125.00

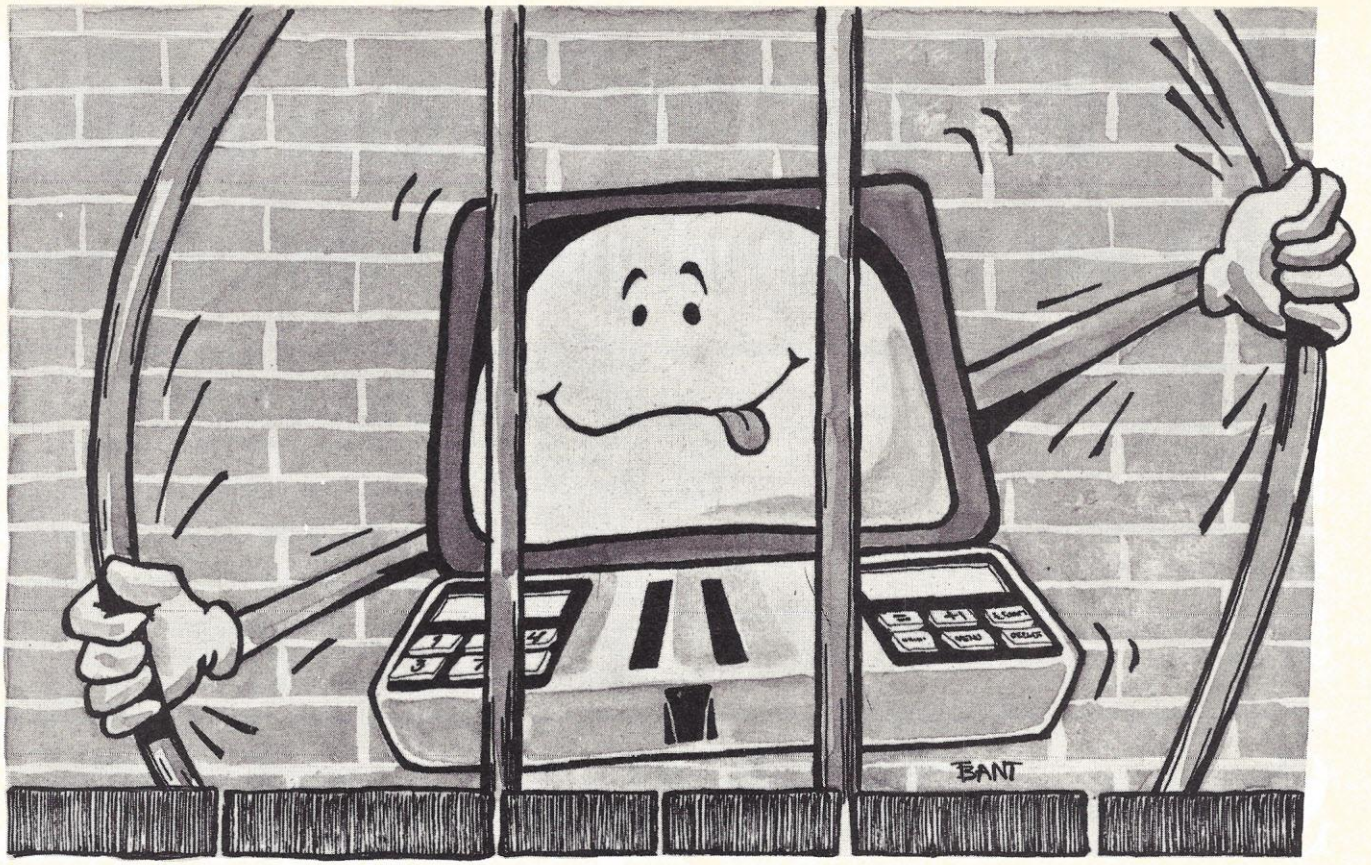
Arithmetic Processor — Add, subtract, multiply and divide; trig and inverse trig functions; square roots, logarithms and exponentiation. Fixed point 16 and 32-bit operation.
Part Number 7811A . . . . . Price: $349.00

Centronics Printer Interface — Interfaces high-speed Centronics-type parallel printers to Apple II™ computers. Features 8-bit parallel data output bus, 4-bit status input, Data Strobe and Acknowledge handshake signals and printer reset signal.
Part Number 7728A . . . . . Price: $125.00

asap computer products, inc.
1198 E. Willow St., Signal Hill, CA 90806

ASAP offers a 30-day buyer protection policy: full money-back guarantee if not totally satisfied.
Ordering Information: name, address, phone, ship by: UPS or Mail. Shipping charge: add $2.50 up to 1 lb. for UPS blue; add $1.50 for U.S. Mail (U.S. only) ($25.00 minimum order). Call for larger shipments.
Terms: We accept cash, check, money orders, Visa & Master Charge (U.S. Funds only). Tax: 6% Calif. res. COD's and terms available on approval (school PO's accepted).

Toll free outside California: (800) 421-7701. Inside California: **(213) 595-6431 (714) 891-2663.**



Break The Software Barrier

Imagine sitting down at your computer system and developing that specialized application you've always dreamed about — with absolutely **no programming!**

Now you can with **PRISM™** — the first Data Base Management System that provides the Total Solution to your information management needs. With **PRISM™** you can have your application up and running in a matter of minutes — not months.

PRISM™

"The Total Solution" MAG

© MAG 1981

PRISM's flexibility and ease of use are combined with its full spectrum of features and capabilities to make it the ideal DBMS for a wide range of business applications. Mailing Lists, Patient Records, Real Estate Listings, and Client Billings are just a few of the possibilities. And **PRISM™** provides the quality, performance, and affordability you have come to expect from MAG software products.

To find out how **your** dreams can become realities, see your **PRISM™** dealer today.

Micro Applications Group, 20201 Sherman Way, Suite 205, Canoga Park, California 91306. (213) 700-1426.

PRISM requires CP/M and CBASIC. (CP/M is a registered trademark of Digital Research. CBASIC is a trademark of Complier Systems.)

CIRCLE 94

Thomas Throop

OUTLOOK

Computer chess: test your skill

Editor's note: There appears to be a growing addiction in some circles to computer chess, as evidenced by the volume of mail we receive requesting that we cover this area of computer use. While we are aware that not all of our readers are addicted, we will feed the habit of those who are whenever we can.

Any readers who wish to submit computer chess articles or information should send same to Leisure Editor, Personal Computing, *50 Essex St., Rochelle Park, NJ 07662.*

A prominent computer game product presently on the market is Texas Instruments' Video Chess for the TI-99/4 personal computer. The product is designed for the beginner to the intermediate-level chess player.

There are various options for choosing the desired computer skill level, the approximate maximum time you would like the computer to "think," the computer's style of play and your choice of color. In one mode the computer program can play up to nine games simultaneously. You may also set up two- and three-move mate problems, and you can ask the computer to solve the problems.

Specific board positions can also be saved on a cassette, and later you may load the positions back into the computer memory from the cassette.

To see the program in action, I decided to challenge the computer. I chose the intermediate level (the highest) for the computer's play, 40 seconds (the range is 30 to 200 seconds) for the approximate maximum thinking time for each computer move, and an aggressive style for the computer's play. I then elected to play the black pieces. One must play the black pieces from the white side of the board, which is awkward, but it's a minor difficulty.

	TI-99/4	THROOP
1.	P-QB4 (a)	P-K4
2.	N-QB3	N-KB3
3.	P-KN3	P-Q4
4.	B-N2	PxP
5.	P-Q3(b)	PxP
6.	QxP	QxQ
7.	PxQ	P-QB3
8.	N-B3	B-Q3
9.	O-O	O-O
10.	B-Q2	B-B4
11.	N-K1 (c)	QN-Q2
12.	N-K4	B-K2
13.	P-QN4 (d)	N-Q4
14.	N-B2	B-N3
15.	P-QR4 (e)	P-KB4
16.	N-B5 (f)	NxN
17.	PxN	BxP (g)
18.	QR-K1	QR-K1
19.	P-R5	P-B5
20.	B-K4	R-B3
21.	QR-N1	P-QN3
22.	P-KN4 (h)	R-Q1
23.	P-N5	R/3-Q3
24.	R-N3	N-B2
25.	B-B3	N-K3 (i)
26.	R/3-N1 (j)	BxB
27.	PxB	NxP
28.	BxP (k)	N-B6 ch.
29.	K-R1	NxB and wins (1)

The game is shown in figure 1. In this figure I have chosen certain moves on which to comment. These are indicated by a lowercase letter in parentheses following the move.

At the beginning of the game, the computer chose the (a) move. In some experiments after the game, it chose this opening five out of 14 times. The computer's (b) move lost a pawn. Q-R4 ch. would win the pawn back. At move 11, the computer chose (c), but P-Q4 would have been better. After move (d) I was planning to play N-B4. (I wonder if the computer "knew" this?)

The attack made in (e) with a minority of pawns on the queen side, couldn't really succeed, and move (f) lost a pawn. With my (g) move, black was then two pawns up with a stronger position. At move 22, the computer chose (h), which was a weak move. My (i) move was a definite error. white could then play BxP and regain one pawn. The computer followed with (j), but should have played BxP. Later, after move (k), the computer lost the bishop. Finally, at move 29, black was a bishop and two pawns ahead, had a better position on the board, and won the game.

All in all, playing against the TI-99/4 was a lot of fun. I should also mention that the screen graphics are quite good, making it easy to follow the board position. Any beginning to intermediate chess players with a TI-99/4 personal computer, should enjoy this Video Chess product.

APPLE • ALTOS • ATARI • MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • ADDS

HP • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • GTE • DIABLO • BMC • CENTRONIC • NEC • HAZELTINE • MEMOREX • AMPEX • PERSONAL SOFTWARE • ADDS • XEROX • DIABLO

BMC • CENTRONIC • NEC • HAZELTINE • AMPEX • VERBATIM • HITACHI • HAYDEN • CANON • NOVATION • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • PERSONAL SOFTWARE • GTE •

MICRO
BUSINESS WORLD INC.
Information Line (213) 996-2252
TOLL FREE MAIL ORDER LINES
(800) 423-5886 Outside Calif.

HEWLETT PACKARD
HP125

MSL 3750.00
Save 760.00
OUR PRICE $2990.00 Special Of The Month
The HP125. It types your letters. And does a lot more.
The HP 125 types, edits and prints everything from memos to reports to high quality letters.
But that's just the beginning. It can also help with financial decisions and do business graphics.

HP DISC DRIVE
Single Master Model 82902M
Dual Master Model 82901M
$1849.00
Our Price $1099.00
MSL $1500.00 Save 401.00
MSL $2500.00 Save 651.00

SHARP BUSINESS COMPUTER 64K

* 5.25" diskette
* 284K byte per disk drive
* 2 disk drives per unit
* Expandable up to 4 units
* Including SHARP's FDOS (Floppy
* Disk Operating System)
MSL 5995.00 OUR PRICE $3995.00 Save $2000.00

NEC STUDENT SYSTEM 64K

*NEC PC 80001A
*NEC PC 8012 A
*NEC PC 8031 A
12" Grn. Phs. Video Monitor
Save $1070.00
Our Price $2495.00
MSL 3565.00

SAM CAN! XEROX 820
WORD PROCESSING SYSTEM (INCLUDES SOFTWARE)

MSL 3495.00 OUR PRICE $2649.00 Save 846.00

commodore
COLOR COMPUTER VIC-20

Vic-TV Modual $19.00
Vic Cassette $69.00
Vic Disk Drive ..... $ Call
Vic 6 Pack program $44.00
MSL 299.00 OUR PRICE $255.00 Save 44.00

HEWLETT PACKARD

	List	Our Price
HP-125 Microcomputer	3750.00	2990.00
HP-85 Microcomputer	3250.00	2475.00
HP-83 Microcomputer	2250.00	1777.00
16K Exp-Memory Module	295.00	255.00
Graphics Plotter 7225	2450.00	2075.00
Personality Mod. For 7225	750.00	665.00
2631B Impact/Printer/ Hvy Dty	3950.00	3250.00
Option 020 For 2631B	150.00	125.00
8 Drives to Choose from 82902S	1300.00	1125.00
9895A 8" Dual Drive	6850.00	5500.00
Graphics Tablet 9111A	2050.00	1678.00
HP-11C Slim-Line Advanced	135.00	119.00
HP-12C Slim-Line Financial	150.00	129.00
HP-41 CV New 2.2 Bytes Mem	325.00	250.00
HP-41-C Calculator	250.00	185.00
Card Reader For 41CV/C	215.00	162.00
Printer For 41CV/C	385.00	289.00
Optical Wand For 41 CV/C	125.00	97.00
Quad Ram Equals 4 Mem. Mods	95.00	81.00
Memory Modules For 41C		25.00
HP-97 Programble Printer	750.00	595.00
HP-67 Programble Calculator	375.00	295.00
HP-34C Programble Scientific	150.00	117.00
HP-38C Programble Bus. R/E	150.00	117.00
HP-32E Adv. Scientific	55.00	48.00
HP-37E Business Mgmt.	75.00	57.00

PRINTERS

EPSON	List	Our Price
MX 80 FT	$ 745.00	$ 549.00
MX 80 IMPACT	645.00	450.00
MX 70 IMPACT	500.00	390.00
MX 100	995.00	765.00
ANADEX 9501	1650.00	1299.00
NEC		
5510	3195.00	2445.00
5515	3295.00	2545.00
3510	2495.00	1795.00
3515	2545.00	1849.00
OKIDATA		
MICROLINE 80	545.00	395.00
MICROLINE 82	649.00	549.00
MICROLINE 83	1050.00	769.00
PAPER TIGER		
445G with Graphics	795.00	695.00
460G with Graphics	1,394.00	899.00
560G New full size	1,695.00	1,139.00
DIABLO (LETTER QUALITY)		
630 R102 bi-directional tractors	2,965.00	2,350.00
1640K109 keyboard tractors	4,000.00	2,899.00
630 RO Receive Only	2,710.00	2,250.00
1650K 136 keyboard tractors	4,000.00	3,100.00

TERMINALS

TELEVIDEO	List	Our Price
910	$ 699.00	$ 599.00
912C	950.00	699.00
920C	995.00	795.00
950C	1,195.00	949.00

DISKETTES SOLD IN BOXES OF 10
(Min. Purchase) $100

DYSAN PRICE PER DISKETTE	List	Our Price
104/1 5" SOFT SECTOR	6.00	3.99
104/1D = " DBL. DEN.-SOFT SEC.	6.40	4.60
3740/1 8" SOFT SECTOR	7.25	4.75
3740/1D 8" DBL. DEN.-SOFT SECTOR	10.75	6.90
MAXELL		
MD-1 5" SOFT SEC-TOR/DBL. DEN.	5.00	3.50
MD-2 " SOFT SECTOR/DBL. SIDE./DBL. DEN.	7.00	4.90
FD-1 8" SOFT SEC./DBL. DEN.	6.50	4.50
FD-1 8" SOFT SEC./DBL. SIDE/DBL. DEN.	8.50	5.95

SOFTWARE

FOR COMMODORE	List	Our Price
Ozz-The Information Wizard	395.00	$289.00
Wordcraft 80	395.00	289.00
Irma-Info Retrieval & Mgmt. Aid	495.00	389.00
Dow Jones Portfolio Mgmt.	149.00	119.00
Pascal Development Pkg.	295.00	219.00
Ebs-Receivables, Inventory	750.00	569.00
Bpi-General Ledger	395.00	389.00
Word Pro 3-40 Column	250.00	175.00
Word Pro 4-80 Column	375.00	259.00
Word Pro 4 Plus	450.00	319.00

MODEMS

	List	Our Price
NOVATION CAT MODEM	189.95	140.00
NOVATION D-CAT	199.00	150.00
NOVATION APPLE-CAT	389.00	329.00
HAYES MICROMODEM	379.00	295.00
HAYES SMARTMODEM	279.00	239.00

commodore

	List	Our Price
8032-32K 80 Col Crt	1495.00	1097.00
4032-32K 40 Col Crt	1295.00	989.00
4016-16K 40 Col Crt	995.00	788.00
8050-Dual Disk 950K	1795.00	1344.00
4040-Dual Disk 343K	1295.00	989.00
C2N-Cassette Drive	95.00	77.00
4022-80 Col Printer	795.00	639.00
8024-Mannsman Talley	1995.00	1545.00
25CPS-Starwriter	1895.00	1399.00
CBM-IEEE Modem	279.00	225.00
Voice Synthesizer	395.00	325.00
VIC 20	299.00	255.00
PET to IEEE Cable	39.95	34.00
IEEE to IEEE Cable	49.95	39.00

MONITORS

BMC	List	Our Price
12" Grn. Phs KQ (15 Hz)	219.00	165.00
12" Grn. Phs EO (18 Hz)	$249.00	185.00
12" Grn Phs (20 Hz)	279.00	209.00
12" Colour Composite Hi Res.	439.00	319.00
Grn. Phs 12"	275.00	165.00
NEC Grn. Phs. 12"	225.00	179.00
Zenith 12"	159.00	119.00
LE MONITOR		
* 9" B & W	179.00	159.00
* 9" Green Phs	189.00	165.00
* 12" B & W	209.00	185.00
* 12" Green Phs.	229.00	199.00
** 12" Green Phs.	199.00	159.00
* Anti Reflective Screen		
** T.V. Grade Screen		
SANYO MONITORS		
13" Color (new) high quality	$550.00	399.00
12" Green Phs.	360.00	269.00
12" B & W	340.00	239.00
15" B & W	370.00	255.00
9" B & W The Best Seller!	235.00	159.00
9" Green Phs.	275.00	199.00

DRIVES

CORVUS	List	Our Price
5 MBYTES	3,750.00	$3,050.00
10 MBYTES	5,350.00	4,449.00
20 MBYTES	6,450.00	5,325.00

EXPANSION BOARD
Q STAR
16K RAM BOARD
LIST 199.00 OUR PRICE 129.00

CALCULATORS

CASIO	List	Our Price
HR-10 Paper Feed	49.95	39.00
HR-12 Paper Feed	54.95	42.00
FR-100 Paper Feed	79.95	59.00
FR-1210 Paper Feed	129.95	99.00
PQ-20	29.95	23.00
LC-785	12.95	10.00
LC-3165	12.95	10.00
FX-68 Scientific	29.95	23.00
FX-81 Scientific	19.95	17.00
FX-3600P Scientific	39.95	29.95
FX-602P "Computer Talk" 88 Memories Pro gramming Upper & Lower Case Dot Matrix 512 Step	129.95	99.00
FX-702P Solves Problems with Alpha-Numeric Clarity, uses Basic Language	199.95	159.00

XEROX

	List	Our Pr
Xerox 820-1 5-1/4" Disk	2995.00	2399.00
Xerox 820-2 8" Disk	3795.00	2995.00
CP/M Operating System	200.00	169.00
Word Processing Software	500.00	429.00
Super Calc	295.00	249.00

SOFTWARE
FOR APPLE II

	List	Our Price
Language System with Apple Pascal	495.00	399.00
BPI General Ledger System	395.00	319.00
Visidex	200.00	159.00
Visicalc	200.00	159.00
Desktop Plan II	200.00	159.00
Microlab Database System	150.00	119.00
Stoneware DB Master	229.00	189.00
Muse Supertext II	150.00	119.00
Softape Magic Window	99.00	72.00

TELE. ANSW. DEVICES

PHONE MATE	List	Our Pr
900	119.95	86.00
905 Remote	199.95	144.00
910	159.95	115.00
920	199.95	144.00
925 Remote	239.95	173.00
930 Remote	299.95	216.00
950 Remote	339.95	245.00
960 Remote	399.95	288.00

ATARI PERSONAL COMPUTERS

	List	Our Price
400 16K Bytes of Ram	595.00	337.45
800 16K Bytes of Ram	1080.00	739.00
410 Program Recorder	90.00	77.00
810 Disk Drive	600.00	457.00
825 Printer (80 col Centronic 737)	999.95	769.00
820 Printer (40 col impact)	450.00	353.00
830 Acoustic Modem	200.00	155.00
850 Interface Module	220.00	192.00
Atari Visicalc	200.00	164.00

TEXAS INSTRUMENTS

	List	Our Price
TI 99/4A Console New Improved	950.00	385.95
10" Color Monitor High Resolution	399.95	339.95
32K Memory Module	399.95	312.95
Speech Synthesizer	149.95	127.95
Disk Memory Drive	499.95	390.95
RF Modulator	49.95	42.50
Telephone Coupler (Modem)	224.95	185.95
Printer (Solid State)	399.95	315.95

1 Year Extended WARRANTY
$99.00
INQUIRE

SAVINGS SERVICE ELECTION SATISFACTION

MICRO MAIL ORDER BUSINESS WORLD WAREHOUSE
18720 Oxnard, #108
Tarzana, CA 91356
OUTSIDE CA CALL TOLL FREE 1 (800) 423-5886 IN CA (213) 996-2252

Telex: 182852
Answer: MICKO TZNA

Name (Please print) _____
Address _____
City _____ State _____ Zip _____

Qty	Make	Model	Description	Price	Total

*California residents add 6% sales tax.
**Add 3% Shipping & Handling — Add 3% surcharge for credit cards. Orders cannot be shipped unless accompanied by payment, including shipping, handling and tax where applicable.

TOTAL ORDER $ _____
TAX IF APPLICABLE* _____
SHIPPING & HANDLING** _____
TOTAL ENCLOSED $ _____

☐ Certified Check or M.O. ☐ Allow 2 weeks clearance for personal check
☐ Bank Wire Transfer

VISA MasterCard

CREDIT CARD # _____
Exp. Date _____ Signature _____

MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • PERSONAL SOFTWARE • CCS

CIRCLE 52

Printer generation evolves

The Printstation 350 series, a new generation of industrial-grade matrix printers, is designed to be the "one-printer solution" for data-processing, word-processing and business-processing applications.

According to Neil Kleinfeld, Centronics' vice-president of marketing, planning and business management, "The key aspect that sets the Printstation 350 Series apart from other peripheral products on the market is that Centronics offers in a single unit, all the functions required to perform the varied applications within today's office environment. Features that were options in the past are now standard on the Printstation 350, eliminating the need to purchase several specialized printers to handle different types of forms."

A standard feature on all models is a paper handling flexibility that accomodates cut-sheet, fan-fold and (immediate tear-off) "demand-document" forms. Reliability and low cost are possible through a modular design concept which incorporates fewer moving parts, in addition to an operator-replaceable printhead and a 10-million-character long-life ribbon cartridge. Designed as a universal machine, eight resident character sets are included along with 110 or 220 volt operation for international use. There are also switchable serial/parallel interfaces.

Additional standard features include pin-addressable graphics, 200 cps print speed, self-test/diagnostics and bidirectional logic-seeking printing.

The series consists of three models: the 350, 352 and 353. Printstation 350 is the "building block" unit based on a bus interface architecture, requiring either a customer- or Centronics-designed formatter and control panel. The 350 encompasses all standard features and can be "customized" by OEMs to suit customer's specialized electronic requirements.

Printstation 352 is designed for 200 cps data-processing quality printing, making it ideal for small-business systems, distributed-processing and communications applications. It combines all the standard features found on the 350 plus a basic communications formatter which has electronic switch-selectable functions to satisfy many data-processing and office applications.

Printstation 353 is a multifunction unit with the added ability to perform high-resolution printing. It uses a multipass capability at 50 cps for word-processing applications in addition to the 200 cps data-processing mode. The 353 combines all the features found on the 350 and 352 plus an operator-programmable control panel for feature selection via a liquid-crystal display. In addition to the standard character sets, the Model 353 has the capability of accepting a user-defined character set via the host computer.

The price for the Printstation 352 is $1795 and the price for the 353 is $2495.

For more information: Centronics Data Computer, Hudson, NH 03051; (603) 883-0111. **CIRCLE 200**

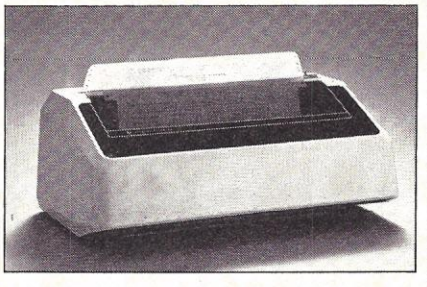
PERIPHERALS

Color Graphics Printer

The Prism Printer is a 132-column dot-matrix printer that will produce eight colors using a four-band ribbon which carries the process colors of cyan, magenta and yellow as well as black.

The printer offers semi-automatic cut-sheet feed. The operator simply inserts an $8\frac{1}{2}$" x 11" sheet in a slot at the bottom of the printer. It is then automatically positioned by the printer for high-throughput printing.

Another innovation is a high-speed data mode. In the normal (correspondence) mode, the unit prints overlapping high density (24 x 9) matrix characters at up to 150 characters-per-second, bidirectionally. The high-speed data mode enables the user to select a standard-density matrix and output large volumes of data at print speeds in excess of 200 cps.



Standard features include proportional spacing, enhanced (bold) text printing and standard print densities of 10, 12 or 16.7 characters-per-inch. The printer prints a full 132 characters-per-line at 10 characters-per-inch.

The price is $1995.

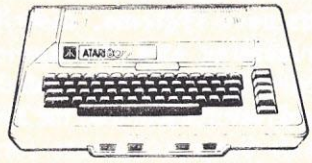
For more information: Integral

NOW TWO LOCATIONS

SAVE TIME • SAVE SHIPPING

ATARI

Computers for people.™



800™ $699

410 Recorder	$59.00
810 Disc Drive	$444.00
822 Printer	$359.00
825 Printer	$629.00
830 Modem	$159.00
820 Printer	$269.00
850 Interface	$159.00
New DOS 2 System	$21.00
CX30 Paddle	$18.00
CX40 Joy Stick	$18.00
CX853 16K RAM	$89.00
Microtek 16K RAM	$75.00
Microtek 32K RAM	$159.00
One year extended warranty	**$50.00**

ATARI 400

16K.... $329
32K.... $478
48K.... $555

Intec 48K Board..... $249

ATARI SOFTWARE

CX404 Word Processor	$119.00
CX404 PILOT	$68.00
CX413 Microsoft Basic	$68.00
CX4101 Invitation To Programing I	$17.00
CX4102 Kingdom	$13.00
CX4103 Statistics	$17.00
CX4104 Mialing List	$17.00
CX4105 Blackjack	$13.00
CX4106 Invitation to Programing 2	$20.00
CX4107 Biorythm	$13.00
CX4108 Hangman	$13.00
CX4109 Graph It	$17.00
CX4110 Touch Typing	$20.00
CX4008 SPACE INVADERS	$32.00
CX4112 States & Capitals	$13.00
CX411- European Countries & Capitals	$13.00
CX4115 Mortgage & Loan Analysis	$13.00
CX4116 Personal Fitness Program	$59.00
CX4117 Invitation To Programing 3	$20.00
CX4118-20 Conversational Languages (ea.)	$45.00
CX4121 Energy Czar	$13.00
CXL4001 Educational Master	$21.00
CX6001-17 Talk & Teach Series (ea.)	$23.00
CX8106 Bond Analysis	$20.00
CX8107 Stock Analysis	$20.00
CX8101 Stock Charting	$20.00
CXL4002 Basic Computing Language	$46.00
CXL4003 Assembler Editor	$46.00
CXL4004 Basketball	$24.00
CXL4005 Video Easel	$24.00
CXL4006 Super Breakout	$30.00
CXL4007 Music Composer	$45.00
CXL4009 Chess	$30.00
CXL4010 3-D Tic-Tac-Toe	$24.00
CLS4011 STAR RAIDERS	$39.00
CXL4012 MISSLE COMMAND	$32.00
CXL4013 ASTEROIDS	$32.00
CXL4015 TeleLink	$20.00
Visicalc	$149.00
Letter Perfect (Word Processor)	$109.00
Source	$89.00
CX481	$75.00
CX482	$109.00
CX483	$54.00
CX484	$319.00

PRINTERS

Centronics 739-1	$649.00
Diablo 630 Special	$1799.00
Epson	
MX70	$359.00
MX80	$469.00
MX80FT	Call
MX100	Call
NEC	
8023	$639.00
7730	Call
7720	Call
7710	Call
Okidata	
82A	$499.00
83A	$769.00
84	$1129.00
Citoh Starwriter	
25 CPS-P	$1329.00
45 CPS-P	$1699.00
Paper Tiger	
445G	$699.00
460G	$899.00
560G	$1129.00
Talley	
8024-7	$1399.00
8024.L	$1629.00
Xerox 820	
System I 5½"	$2450.00
System II 8"	$2950.00
CPM 5¼	$169.00
Word Processing	$429.00
Super Calc	$269.00

computer mail order saves

Atari	
Microtek 16K	$64.00
32K	$129.00
Intec 32K	$139.00
40K	$219.00
Ramcrom 128K	$519.00
Apple	
Microtek 16K	$94.00
32K	$129.00
Commodore	
64K upgrade	$389.00
Hewlett Packard	
16K upgrade	$249

RAM SALE!

TI-99/4A $379

PHC 004 TI-99/4 Home Computer	$399.00
PHP 1600 Telephone Coupler	$169.00
PHP 1700 RS-232 Accessories Interface	$169.00
PHP 1800 Disk Drive Controller	$239.00
PHP 1850 Disk Memory Drive	$389.00
PHP 2200 Memory Expansion (32K RAM)	$319.00
PHA 2100 R.F. Modulator	$43.00
PHP 1100 Wired Remote Controllers(Pair)	$31.00
32K Expansion	$329.00
PHP Printer Solid State	$319.00

Texas Instruments

PHM 3006 Home Financial Decisions	$26.0
PHM 3013 Personal Record Keeping	$43.0
PHD 5001 Mailing List	$60.0
PHD 5021 Checkbook Manager	$18.0
PHM 3008 Video Chess	$60.0
PHM 3010 Physical Fitness	$26.0
PHM 3009 Football	$26.0
PHM 3018 Video Games I	$26.0
PHM 3024 Indoor Soccer	$26.0
PHM 3025 Mind Challengers	$22.0
PHM 3031 The Attack	$35.0
PHM 3032 Blasto	$22.0
PHM 3033 Blackjack and Poker	$22.0
PHM 3034 Hustle	$22.0
PHM 3036 Zero Zap	$18.0
PHM 3037 Hangman	$18.0
PHM 3038 Connect Four	$18.0
PHM 3039 Yahtzee	$22.0
PHM 3017 Terminal Emulator I	$39.0
PHM 3026 Extended Basic	$88.0
PHM 3035 Terminal Emulator II	$45.0

HOW TO ORDER: Phone orders invited or send check or money order and receive free shipping in the continental United States. PA residents add 6% sales tax.

computer mail order west

800-648-3351

IN NEVADA, CALL (702) 588-5654

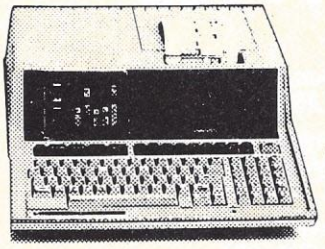
P.O. BOX 6689, STATE LINE, NEVADA 89449

TO SAVE YOU MORE!
COSTS • SAVE SALES TAX

you more money & time!

HEWLETT PACKARD

NEW! HP•125	$2999.00
HP•83	$1699.00
HP•85 16K Memory Module	$249.00
5¼" Dual Master Disc Drive	$2129.00
Graphics Plotter (7225B)	$2079.00

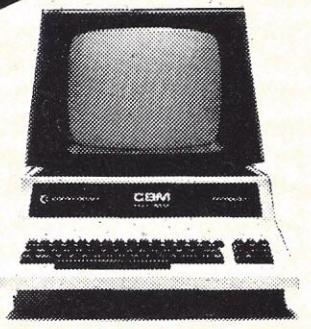


NOW IN STOCK!
The new HP41CV Calculator
$259

Call for HP Software Prices & Information.
Call for Calculator prices.

HP•85 $2479

CBM 8032
$1069



commodore

8032	$1069.00
4032	$969.00
4016	$769.00
8096	$1569.00
Super Pet	$1599.00
2031	$529.00
8050	$1299.00
4022	$599.00
C2N	$63.00
Word Pro 4 Plus	$299.00
Word Pro 3 Plus	$199.00

SOFTWARE

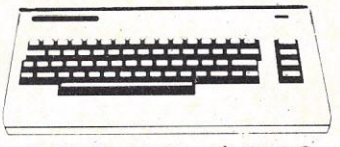
WordPro3 Plus	$299.00
WordPro4 Plus	$329.00
Commodore Tax Package	$399.00
Visicalc	$149.00
BPI General Ledger	$329.00
OZZ Information System	$289.00
Dow Jones Portfolio	$129.00
Pascal	$239.00
Legal Time Accounting	$449.00
Word Craft 80	$289.00
Power	$89.00
Socket-2-Me	$20.00
Jinsam	$Call
MAGIC	$ Call
The Manager	$209.00
Softrom	$129.00

Terminals

Televideo	
910	$579.00
912C	$699.00
920C	$749.00
950	$939.00
Call for computers	
Zenith 719	$749.00
Adds	$549.00

Monitors

Amdex 12" B&W	$149.00
12" Green	$169.00
13" Color	$349.00
Sanyo 12" B&W	$259.00
12" Green	$269.00
13" Color	$449.00
TI 10" Color	$349.00
Modems	
Novation Auto	$239.00
D Cat	$169.00
Cat	$159.00
HAyes	
Smart	$239.00
Pioneer Lazer Disk	$599.00
BSR X-10 Systems	
PK 500	$84.00
LM 501	$16.00
AM611	$17.00
AM286	$17.00



VIC 20 $259 COMPLETE

Vic-TV Modual	$19.00
Vic Cassette	$69.00
Vic 6 Pack Program	$44.00
VIC1530 Commodore Datassette	$69.00
VIC1540 Disk Drive	$499.00
VIC1515 VIC Graphic Printer	$399.00
VIC1210 3K Memory Expander	$32.00
VIC1110 8K Memory Expander	$53.00
VIC1011 RS232C Terminal Interface	$43.00
VIC1112 VIC IEEE-488 Interface	$86.00
VIC1211 VIC 20 Super Expander	$53.00
VIC1212 Programmers Aid Cartridge	$45.00
VIC1213 VICMON Machine Language Monitor	$45.00
VIC1901 VIC AVENGERS	$23.00
VIC1904 SUPERSLOT	$23.00
VIC1906 SUPER ALIEN	$19.00
VIC1907 SUPER LANDER	$23.00
VIC1908 DRAW POKER	$23.00
VIC1909 MIDNIGHT DRIVE	$23.00
VT106A Recreation Pack A	$44.00
VT107A Home Calculation Pack A	$44.00
VT164 Programmable Character/Gramegraphics	$12.00
VT232 VICTerm I Terminal Emulator	$9.00

Add 3% for VISA or MC. Equipment subject to price change and availability without notice.

computer mail order east
800-233-8950

IN PA. CALL (717) 327-9575
501 E. THIRD ST., WILLIAMSPORT, PA 17701

CIRCLE 54

Data Systems, Milford, NH 03055; (603) 673-9100. **CIRCLE 201**

Dot-Matrix Printer

The Z-25 is a dot-matrix line printer that prints in excess of 150 characters-per-second and at speeds up to 300 lines-per-minute. It interfaces with most standard personal-computer systems using serial RS-232-C or 20mA current loop.

Features of the new printer include an inked nylon cartridge ribbon to make ribbon replacement clean and easy, a 9 x 9 dot matrix, a 96-character ASCII set consisting of upper- and lowercase plus 33 graphics characters, character width selection of 10, 12, 13.2 or 16.6 characters-per-inch.

Light emitting diodes on the control panel indicate if the printer is on, if it is on-line with the computer, or if it is out of paper, jammed or has the cover open.

The price is $1595.

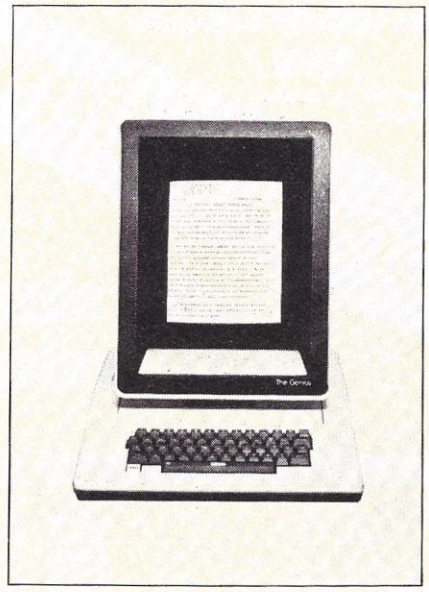
For more information: Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60025; (312) 391-8181. **CIRCLE 202**

Full-Page Display

The Genius is a full-page CRT display terminal that is Apple compatible. It was developed for the office automation industry, applying to word processing, data processing and software development.

The 15-inch screen displays 57 lines of text by 80 characters across, and optionally, 66 lines by 80. The system is fully compatible with WordStar and other packages including CP/M-based programs.

For software development, the system can display large sections of code at one time for editing and debugging. The high-resolution display has an 87 MHz bandwidth and 6k bytes of high-speed buffer memory to refresh the screen.



An Apple interface card is standard with The Genius which is priced at about $1795.

For more information: Micro Display System, 514 Vermillion St., Hastings, MN 55033; (612) 437-2233. **CIRCLE 203**

VDT and Printer

The Model 1500 video display terminal and the Model 630 letter-quality printer are designed to be used in data-processing and word-processing applications.

The general purpose VDT may be used in all types of interactive data

continued on page 121

CALL YOUR LOCAL DYSAN OFFICE

St. Louis, Missouri
(314) 434-4011

San Francisco, California
Sunnyvale, California
(408) 730-2145

Sherman Oaks, California
(213) 907-1803

McLean, Virginia
(703) 356-6441

Irvine, California
(714) 851-9462

New York, New York
(212) 687-7122

Schaumburg, Illinois
(312) 882-8176

Fair Oaks, California
(916) 966-8037

Glendora, New Jersey
(609) 939-4762

Bellevue, Washington
(206) 455-4725

Atlanta, Georgia
(404) 952-0919

Arlington, Texas
(817) 261-5312

Burlington, Massachusetts
(617) 273-5955
(617) 229-2800 (OEM)

Rocky River, Ohio
(216) 333-3725 (Cleveland)
(412) 261-0406 (Pittsburgh)

Livonia, Michigan
(313) 525-8240

Dysan Flexible Diskettes are also available from all ComputerLand Stores, Sears Business System Centers, and independent computer outlets nationwide.

For the location of the Dysan sales outlet nearest you, contact Dysan at:
(408) 988-3472;
Toll Free: (800) 538-8133;
Telex 171551 DYSAN SNTA;
TWX: 910-338-2144.

DID YOU KNOW THAT THE BEST MEDIA AVAILABLE IS NOW AVAILABLE NEAR YOU?

Well, it is.

For years, we've been supplying discriminating data processing professionals worldwide with the finest magnetic media made anywhere... Dysan diskettes, mini-diskettes, disc packs, disc cartridges and single rigid disks.

Is there any reason why **you** should have to settle for second best?

Now you can buy Dysan precision diskettes and mini-diskettes direct from the Dysan sales office or authorized dealer near you. And they're not just any diskettes. They're certified 100% error-free both on **and** between the tracks to insure you of flawless performance. That means no lost data. No need to re-program. Or de-bug again. Dysan diskettes work the first time, every time. Think about how much time, energy and aggravation you can save.

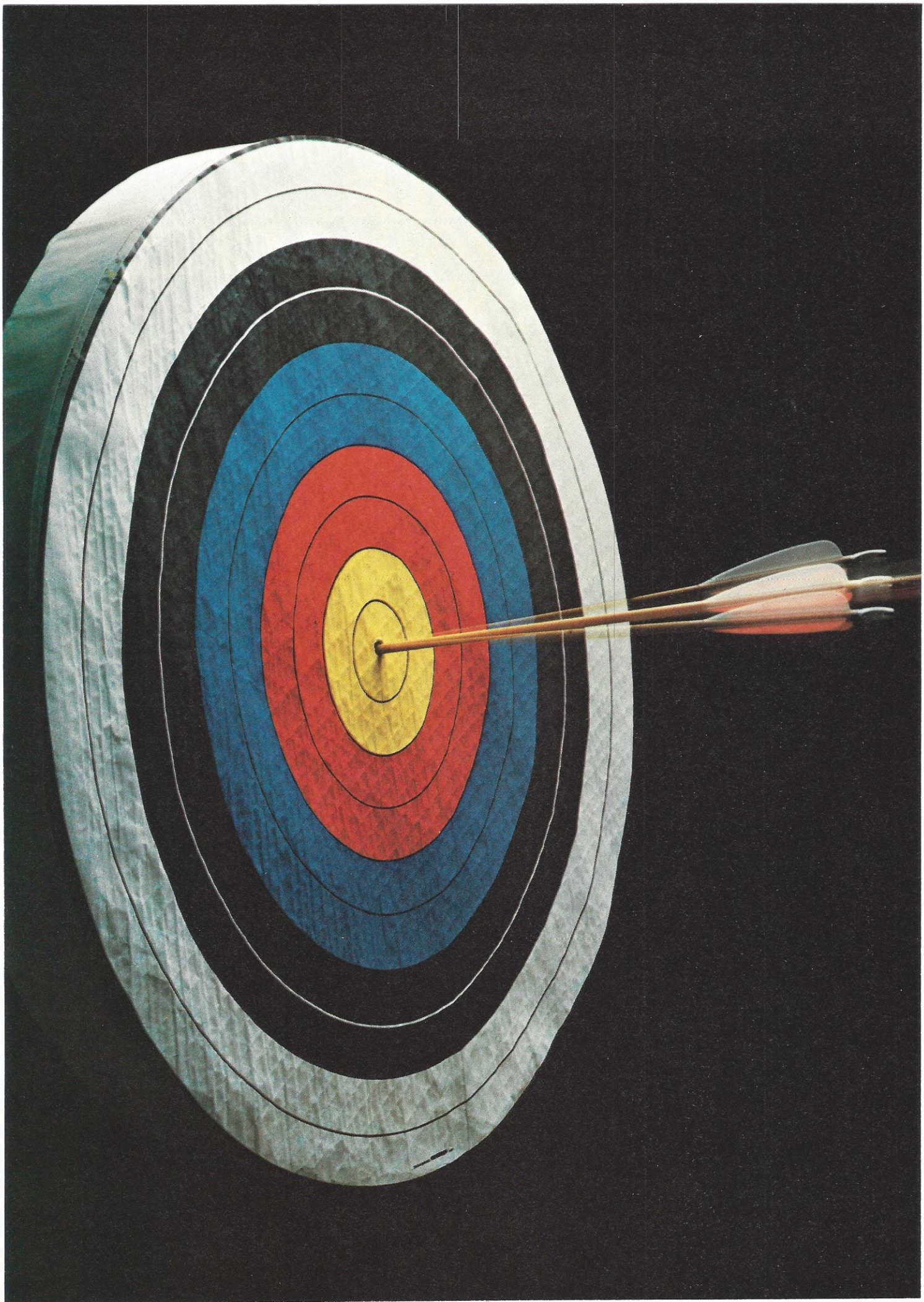
Why wait for problems to occur to convince you that a bargain diskette is really no bargain? Call the Dysan office nearest you. Or stop in your nearest authorized Dysan dealer. Once you experience the Dysan difference you won't settle for anything less.

dysan Dysan CORPORATION

Our Media Is Our Message

5201 Patrick Henry Drive
Santa Clara, CA 95050

CIRCLE 56



Keep your company ahead of the game. On TARGET.™

Successful companies stay ahead of the game with accurate analysis of past performance and accurate projections of future possibilities. An army of accountants with a lot of time can do that kind of planning. So can a huge, expensive mainframe computer.

And now, so can you. All by yourself. With the TARGET Business Planning System for as little as $195 and an affordable microcomputer. You play the big business game for real, at a small-business price.

Target: reduced risk.

Business conditions change very fast these days. TARGET planning helps your company keep pace. Makes it easy to ask crucial "what if" questions—What if labor costs go up 15%? What if the prime rate increases 1.25%?—and get accurate answers at once. So you can plan for change in advance. Which helps reduce risk. Which helps keep your company's growth and profit on target.

TARGET does what you want.

Cash flow analysis/projections.
Sales projections.
Budget planning.
Job costing.
Acquisition/merger analysis.
Tax calculations/projections.
Loan analysis.

You can do all this and much more with TARGET. You set the kind of results you want, and the steps you want taken to deliver them. TARGET is so flexible and has so many capabilities that it *is* a little like an army of accountants ready for your orders. And the orders can be complex. "Figure likely future outcomes on the basis of past results." Or, "If this number is greater than that number, calculate this percentage. Otherwise calculate yet another percentage."

It does things your way.

With TARGET you can get printed reports, in the form you set up, for each of your procedures. You can also get printed reports of the steps you used in each procedure, so that others can use it. You save procedures and specific figures separately, so you can update or look at other possibilities fast, sometimes by changing just one number. You can feed reports directly into a word processing system. And if you want to change a report format, or add another year or branch or product into your calculations, that's easy too.

All you need to know is your business.

You don't have to know a lot about computers or, for that matter, about business planning to use TARGET profitably. TARGET understands an easy English-like language. It uses conventional mathematical steps. It comes with a manual that's been called "the best...full of clear examples and excellent sample models" (*Personal Computing* magazine, June 1981). And TARGET comes from a company—Advanced Management Strategies, Inc.—that's totally committed to giving you any help you need.

You can build on TARGET too.

The TARGET Business Planning System is fully integrated to let your planning capabilities grow. You can start with Planner™ or PlannerCalc™ (same as Planner, only with an alternative way of setting up and calculating) at $195. MasterPlanner™ combines Planner and PlannerCalc features and allows you to handle larger plans, $495.

Options that work with any of the above: Business Analyst,™ which speeds the handling of more complex procedures, $395; Peach PIE,™ which lets you draw from and add to information in the Peachtree General Ledger package, $179; and Interchange,™ which lets you merge and split various procedures, $139.

Plus TASK,™ a stand-alone project-management aid that performs critical-path analysis to help you meet tight schedules and budgets, $329.

What machines?

You can use TARGET on most microcomputers, including those from IBM, Xerox, NEC, Apple, Zenith, Vector and Tandy.

Let us tell you more.

Get ahead of the game on TARGET. Call or write us today for the location of your nearest dealer.

AMSI, Suite 200, 1935 Cliff Valley Way, Atlanta, Georgia 30329
404/634-9535

TARGET™

CIRCLE 51

CRYSTALWARE

ATARI 48K — w/disk

TRS-80 48 — w/disk

APPLE 48K — w/disk

THE FINEST IN FANTASY GAME SOFTWARE

"Having previewed over fifty of your competitors' games, I can assure you that your use of scrolling far exceeds anything I've seen for the Atari and, of course, for the Apple. I'm very impressed by the dedication and quality that your company exhibits by virtue of this demo." **David Sosna** — Associate Producer, Universal Pictures

Crystal has done its best to become the Porsche of the computer game industry. New scrolling techniques, video disk games, a real-life fantasyland — our mad programmers toil onward with little food or sleep to produce some incredible firsts in the microcomputer world. If you are an unappreciated genius and want to join our staff to help create the world of tomorrow today, give me a call. Our magazine *Crystal Vison* will within the next month have a circulation of 80,000 and we look forward very soon to producing our first full length motion picture. I'd like to thank my friends at Votrax and Axlon for giving us the tools (128K RAM for Atari and a vocal text synthesizer) to truly produce some programming miracles.

★ ★ ★ NEW RELEASES ★ ★ ★

THE CRYPT — One evening you awake at sunset to find yourself in what appears to be an endless cemetery. Although defenseless, you must somehow find your way out or perish from the hideous assaults of flesh-eating zombies, rats, vampires, werewolves, and other repulsive monstrosities. To escape you may have to descend into the catacombs beneath the cemetery. This game is a little different from the others of our series because we use a lot of static graphics to set the mood. It is similar in some respects (without any copying intended) to those of our friends at On-Line who produce excellent static graphic adventures. You must use all your common sense and a great deal of courage to escape from this perilous adventure alive. We have made it so nearly impossible that the first player to do it successfully will receive a $200.00 prize. **$49.95 2 disks**

QUEST FOR POWER by Mark Benioff — An extraordinary game with the adventure and magic of Arthurian legend. Join Galahad as he leaves Camelot in search of the Scroll of Truth. Explore the treacherous depths of the Caves of Somerset, visit the medieval city of Essex. Along the way you will meet powerful wizards and great prophets. The villages of Sunderland and Leeds dot your path. Somewhere in an evil castle called Skenfirth, lurks the devil himself, while the Evil Giant Gogmogo, hungry for human prey, roams the forests. In Fantasyland tradition we include 64 full screens of hires scrolling and some sensational graphic and animation sequences. Well worth the **$39.95 1 disk**, enjoyable to all ages.

★ ★ ★ GALACTIC EXPEDITION ★ ★ ★

The year is 3021, almost 100 years since the expedition to the Sands of Mars has returned. The Starship Herman now rests quietly in the Zikon Museum in New Brisbane. It's nearly 80 years since World War III, the Ames Research Center celebrates its 150th anniversary, and you stand at the unveiling of a truly technological wonder — the first ion-propelled vessel, saucer-shaped Lady Joanne, its viewport of pure diamond, its hull of synthetic emeralds. The Martian glyphs of the Meshim and those of Lemuria have now been deciphered and it appears that a much greater mystery is about to unravel. 7 planes and 7 doors — 7 guardians and 7 candles. 7 strange new worlds await the ultimate adventurer to unlock a timeless secret. The starship may seem strange and unfamiliar to our veteran adventurers, faced with its marvelous new technology; this craft must be flown by constant monitoring of ion stabilizers. During your galactic expedition you are surrounded by the flickering heavens, beset by meteor showers and time-warps. Each unique world holds one of the 7 keys to unlock the Great Mystery. The games all run off the Main Module which also is a game unto itself.

From Earth to Moon — On the Moon's dark side lie entrances to caverns extending to the moon's hollow core which contains a timeless secret. Here live a race of burrowing creatures, who have built vast earthen cities with storehouses full of precious stones. Gravity is extremely critical and you must use all your skills to manually land your craft. This first Master Disk contains the dos needed to run additional scenarios. Its price is **$39.95** and includes 64 screens of Hires graphics.

Mists of Venus — On Venus' ever hot surface are endless jungles and swamps. The air is unbreathable and spacesuits and oxygen must be carried. This world is especially treacherous with all sorts of loathsome creatures and hardly any place dry enough to land your ship. Beneath the green seas our adventurer may find the second key to solving the Mystery. **$29.95** (must have Master Disk to run)

Planet Herman — It is hard to tell where Herman's atmosphere ends and the surface begins. Much of this adventure will have the feeling of a starship submarine. Navigating around Herman is very dangerous but with a computer on board Lady Joanne it may be just possible. This senario costs **$29.95** and needs the Master to run.

The Asteroid Belt — Every play something oids. A combination of the best machine language sub-routines of our new Crystaloids with a fast moving adventure game. Penal colonies, lurking pirates, and some unusual forms of scavenger life exist here. It's difficult to travel in the Asteroid Belt without getting blown up. Perhaps you should find some expert help by rescuing a pilot, who is also a sentenced thief or murderer, from one of the penal colonies. There are places for trading and you may wish to indulge yourself with a visit to the sensual Pleasure Planet. **$29.95** (needs Master Disk)

Uranus - World of Ice — A freezing place with nights of —200° F. Bring along Thermasuits, as well as some Laars with which to battle the Grungik, a 12 foot tall relative of Big Foot, fond of human flesh. Uranus also has a secret inner labyrinth with tropical flora and fauna. However, the King of the Ice Planet, Norion may have his own idea about your trespassing. Without proper clothing, weapons and supplies, your stay here may be very exciting and very short. **$29.95** (needs Master Disk to run)

Jupiter - World of Dwarfs — How would it feel to weigh 300 or so lbs.? A trip to Jupiter should fill you in fast. There is a particularly interesting red spot on Jupiter and a curious set of moons. Picking up some antigravs will help. Landing should really tax your energies. In the Jupiterian atmosphere, you fall fast! Be prepared to use 10 times the normal amount of fuel. Better find the 6th key quickly before your fuel and food are exhausted. **$29.95** (needs Master Disk)

The Crystal Planet - You will have to embark on this final portion of your expedition ignorant of what you may encounter here on this mysterious planet, excepting that the 7th world holds the ultimate key to winning the contest. **$29.95** (needs Master Disk)

The Contest — To the Winner with the highest score, who solves the mystery by November of 1982 will go $5000.00 in cash. Good Luck!

★ ★ ★ ★ ★ ★

GLAMIS CASTLE — According to ancient legend and records this castle is one of the most haunted sites in Great Britain. One Lady Glamis, known to be in league with the devil, liked to send out a destructive demon to harrass the townspeople. She finally was burnt at the stake on Castle Hill, cursing as she died all future generations of the Lyon family. Her demon still seems to haunt that spot, murdering the curious who stray up to Castle Hill after dark. The curse stipulated that each succeeding generation would have at least one child, often female, who would be a vampire. When an heir comes of age, there is a secret ceremony in which the heir, his father, and the steward take crowbars and chip away plaster concealing a hidden chamber, known only to them, that Earl Patie used when he gambled with the devil. Another tradition says that a creature, half-man, half-beast stalks the passages in the walls of Glamis to insure the fulfilling of the curse. The mystery, of course, is to determine the location of this secret chamber. Our game, occupying 2 disks, will have as exact a replica of the castle as possible. It's definitely one of a kind! And we will be offering a $500 prize to the first person daring enough to solve the centuries-old mystery of Glamis Castle. **$49.95 2 disks.**

Crystal has many other fine fantasy and space games. For a copy of CRYSTAL VISION which includes a complete catalog please send $3.00 to the address below.

Our order lines are open 24 hrs. a day 7 days a week.

(408) 778-2966 **CRYSTAL COMPUTER** **17120 Monterey Rd., Morgan Hill, CA 95037**

master charge VISA

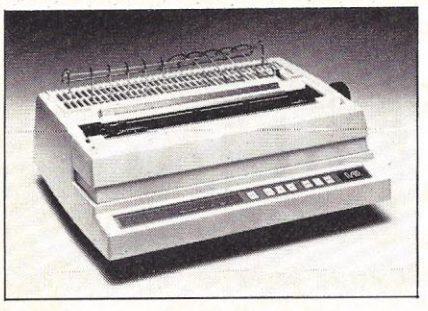
CIRCLE 57

continued from page 116

processing. Its flexibility and operator-oriented features improves the efficiency of both the software and the user, the company says.

Among the key features offered by the VDT are: a 24-line x 80-character display, high-legibility 7 x 10 dot matrix, switch-selectable speeds to 19.2 kilobaud, full cursor controls, a separate numeric key pad, programmable brightness levels and an auxiliary output port.

The daisywheel printer can be used for word-processing applications and printing or producing multiple-carbon sets. It features a range of interchangeable type fonts, graphics capability, variable character and line spacing, and automatic paper handling facilities. The daisy printer mechanism allows the use of both plastic and metal print wheels at speeds of up to 40 cps.



The price of the Model 1500 VDT is $1225 and the Model 630 printer costs $2995.

For more information: Rair Computer Corp., 4101 Burton Dr., Santa Clara, CA 95050; (408) 988-1790.

CIRCLE 204

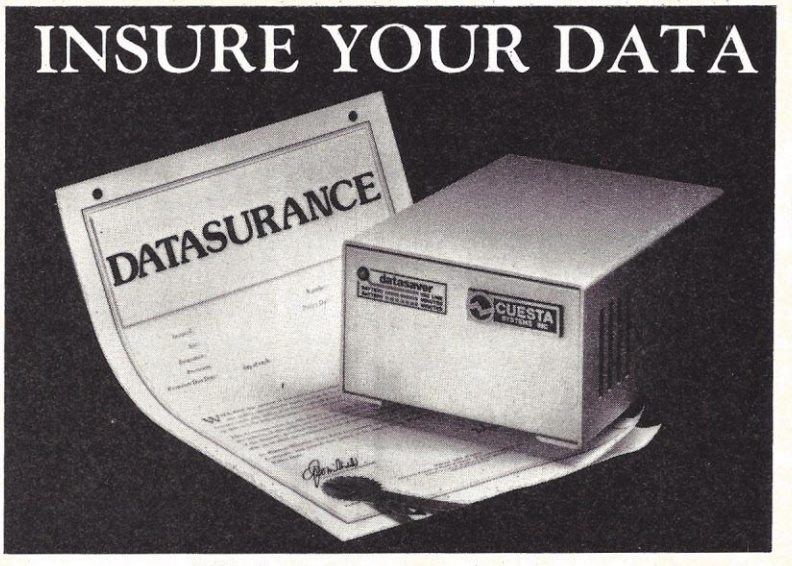
SYSTEM

Instrumentation Applications

The Model 48 IEEE-488 Bus Controller/Computer System allows fully integrated GPIB (general-purpose interface bus) control and data processing.

The heart of the system is a 4-layer, single-board GPIB controller that features two independent GPIB ports each with a bus transfer rate in excess of 14k per second. The controller also includes an RS-232 serial port and two parallel data ports.

The Model 48 features a built-in 12-inch CRT with a full 80-by-24 character display. The monitor, which has scrolling capability, features a 25th line for displaying sys-



With Back-up Power for Business, Personal Microcomputers.

Like a good insurance policy, DATASAVER™ safeguards both the time invested and the data contained in your system by protecting your computer against unexpected power failures, brownouts, or other line disturbances.

DATASAVER provides up to 90 watts of continuous power during short-term interruptions, (2-5 minutes at full power, 15 minutes at half power) ... enough time to close out files and shut down the system if the power loss continues.

DATASAVER comes complete with rechargeable sealed battery, automatic battery charger, solid state power inverter, AC line voltage monitor and cutout switch, front panel status LED, and an audible alarm buzzer.

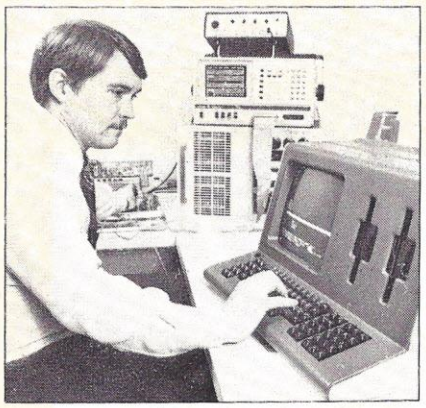
You owe it to yourself to check out "DATASAVER." See the DATASAVER at your local dealer or call/write for additional information:

CUESTA SYSTEMS INCORPORATED
3440 Roberto Court,
San Luis Obispo, CA 93401
(805) 541-4160

DEALERS ... find out how easy it is to become a DATASAVER Dealer. Ask for a free Dealer Kit.

CIRCLE 45

tem status as well as the time and date. A standard QWERTY keyboard is used for manual entry of data. Up to 132 columns of hard copy are provided by an optional impact dot-matrix printer.



The system contains 64k of internal memory. An additional 350k of mass storage capacity is supplied by a 5¼-inch floppy disk drive. An optional second drive can increase storage capacity to 700k.

The Model 48, which contains Z80 and 8085 microprocessors, is supplied with the industry-standard CP/M operating system. In addition, the text editor, assembler and debug software software is provided.

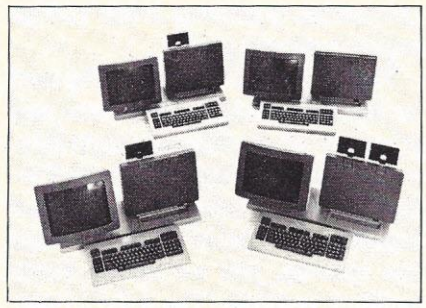
The system is priced at $5500 and the optional dot-matrix printer costs $1500.

For more information: Systel Computers, 538 Oakmead Pkwy., Sunnyvale, CA 94086; (408) 746-2901. **CIRCLE 205**

Multi-Function Workstation

The AWS workstation offers a half megabyte of mass storage in a desktop unit. The new computers, based on the Intel 8088 16-bit microprocessor, offer a combination of mini-floppy and mini-Winchester disk drives mounted on the same desktop enclosure as the processor and display.

The workstation consists of an 8088 processor, up to 512k bytes of random access memory (based on 64k RAM chips), a high-quality 80-character by 28-line video display unit, and optional mass storage.



The processor, RAM memory, input/output and video control logic

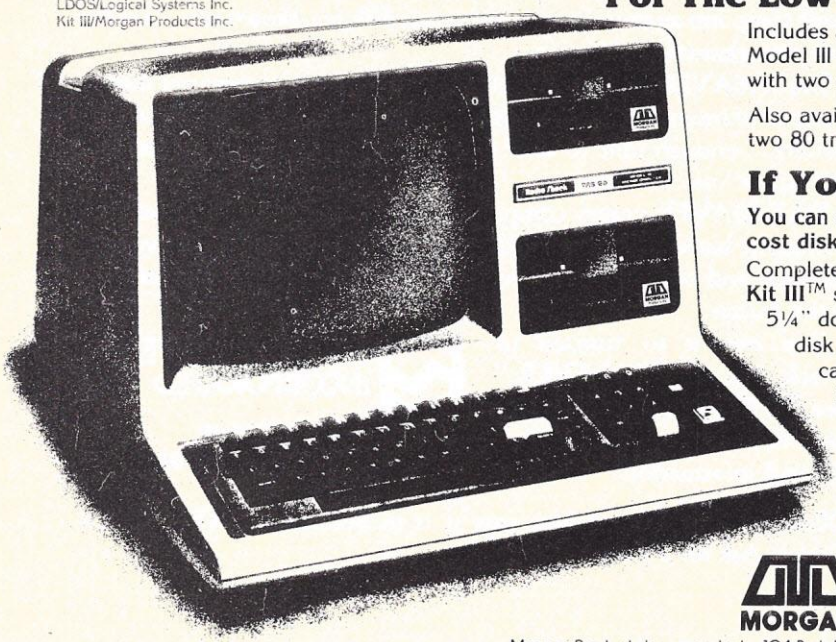
SAVE $600.00
On TRS-80® 48K Model III

TRADEMARKS:
TRS-80 and TRSDOS/Radio Shack/Tandy Corp.
LDOS/Logical Systems Inc.
Kit III/Morgan Products Inc.

Limited Supply Now Available
For The Low-Low Price Of $1895.00

Includes all the standard basic features of the TRS-80® Model III with 48K of RAM and disk expansion Kit III™ with two 40 track double density disk drives.

Also available — TRS-80® Model III same as above with two 80 track disk drives for only **$2145.00**



If You Own A 16K Model III.

You can easily expand your capabilities with our low cost disk expansion Kit III.™

Completely compatible with **TRSDOS™** and **LDOS,™** the **Kit III™** single drive assembly includes: One 40 track 5¼" double density disk drive, power supply, floppy disk control card, mounting hardware, applicable cables and instructions. **ONLY $599.00**

Also available — Kit III™ same as above with one 80 track disk drive for only **$724.00**

LDOS™ disk operating system **$99.95**

Printers available . . . call for more information.

Call TOLL FREE (800) 851-4614
In Illinois Call (618) 233-0018

We accept: Visa, Master Charge, Certified Checks (Personal checks require three weeks clearance), Money Orders, and C.O.D.

MORGAN

Morgan Products Incorporated 104 Berkshire Drive Belleville, Illinois 62223

CIRCLE 61

WHY PLAN 80?

PLAN80™ is a new system that takes the big business, big computer approach to computer modeling and adapts it to smaller computers, which are inherently more friendly and responsive.

If you are not already familiar with the world of financial modeling you will soon wonder how you managed without a system like PLAN80. If you are familiar with the art you will find it incredible that a microcomputer can do so much of what has previously been the domain of million dollar machines.

PLAN80 WILL DO 99% OF THE JOBS DONE BY COMPUTER MODELING SYSTEMS COSTING $50,000

SB-80 and Software Desk Reference are trademarks of Lifeboat Associates
PLAN80 is a trademark of Business Planning Systems CP/M-80 is a trademark of of Digital Research, Inc.
Copyright © 1981, by Lifeboat Associates

CIRCLE 58

Check your interests:

- ☐ Profit Planning
- ☐ Cash Management
- ☐ Acquisition Analysis
- ☐ Market Simulation
- ☐ Resource Allocation
- ☐ Lease vs Purchase Analysis
- ☐ Purchase Price Trends
- ☐ Balance Sheet Projection
- ☐ Cost Center Budgeting
- ☐ Productivity Trend Analysis
- ☐ Sales Projection and Analysis
- ☐ Marketing Strategy Development
- ☐ Capital Project Evaluation
- ☐ Headcount Analysis and Control
- ☐ Cost and Variance Analysis
- ☐ R&D Project Evaluation
- ☐ Energy Accounting
- ☐ Cost Estimating
- ☐ Consolidations
- ☐ Tax Planning

- ☐ Please send more information about PLAN 80
- ☐ Please send a free Software Desk Reference™

Dealer, Distributor, and OEM inquiries invited

Please note: All Lifeboat Associates microcomputer software requires SB-80™ or other CP/M-80® compatible operating system.

NAME

TITLE

PHONE

COMPANY

STREET

CITY STATE ZIP

3211

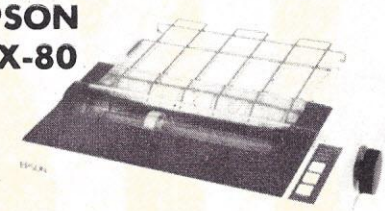
For More Information, contact

LIFEBOAT ASSOCIATES
1651 Third Avenue
New York, New York 10024
Tel: (212) 860-0300
TWX: 710-581-2524 (LBSOFT NYK)
Telex: 640693 (LBSOFT NYK)

FEBRUARY SPECIALS

WE CARRY THE COMPLETE LINE OF ATARI SOFTWARE, PERIPHERALS AND ACCESSORIES.

EPSON MX-80



INTERFACES & CABLES

APPLE INTERFACE & CABLE $90.
IEEE $55 RS-232 $70.
TRS-80 CABLE $35.

$449.00

NEC GREEN 12" MONITOR JB 1201M

$159.00

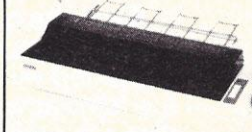
PERSONAL COMPUTERS

CBM 8032 Computer	1149.00	NEC PC-8023 Printer	$629.00
CBM 8050 Disk Drive	1349.00	NEC 5510 Spinwriter (7710)	$2345.00
CBM 4032 Computer	1029.00	NEC 5520 Spinwriter (7720)	2695.00
CBM 4040 Disk Drive	1029.00	NEC 5530 Spinwriter (7730)	2345.00
CBM 4022	649.00	NEC JC 1201 M(A) — Color 12" Monitor	359.00
CBM VIC-20	269.00	NEC 12" JB1201M Monitor	159.00
Amdek 100G	169.00	Okidata Microline-80	379.00
Amdek Color – 1 13" Color Monitor	329.00	Okidata Microline-82A	499.00
Microtek 16K Ramboard for Atari 800	79.00	Okidata Microline-83A	729.00
Microtek 32K Ramboard for Atari 400 and 800	149.00	Diablo 630	1995.00
Qume Sprint 9/45 (Full Panel)	2295.00	Apple II Plus 48K	1199.00
Atari 400 16K	349.00	Apple Disk w/3.3 DOS Controller	569.00
Atari 825 Printer	599.00	Apple Disk w/o Controller	469.00
Atari 850 Interface	139.00	Hazeltine 1420	799.00
Atari 810 Disk Drive	449.00	Northstar Horizon II 32K QD	2925.00
Atari 800 16K	749.00	Anadex DP-9500/9501	1249.00
Epson MX-70	349.00	Telvideo 910	559.00
Epson MX-80	449.00	Televideo 912C	669.00
Epson MX-80 FT	549.00	Televideo 920C	729.00
Epson MX-100 FT	729.00	Televideo 950	929.00

OKIDATA MICROLINE 80 MATRIX PRINTER
$379.00

ATARI 810 DISK DRIVE
$449.00

AMDEK COLOR-1 MONITOR
$329.00



EPSON MX-100 FT PRINTER
$729.00

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

CALL OMEGA TOLL FREE!

WEST COAST
1-800-235-3581
OMEGA SALES CO.
3533 Old Conejo Rd. #102
Newbury Park, CA 91320
1-805-499-3678
CA. TOLL FREE 1-800-322-1873

EAST COAST
1-800-556-7586
OMEGA SALES CO.
12 Meeting Street
Cumberland, RI 02864
1-401-722-1027

OMEGA SALES COMPANY

We Accept C.O.D.'s • Stock Shipments Same Day or Next • No Surcharge for Credit Cards
• All Equipment Factory Fresh w/MFT Warranty • We Carry the Complete Line of Personal Software
• Prices do not Reflect Shipping Charges
Rhode Island and California Residents please add 6% Sales Tax

CIRCLE 59

are on a single printed cricuit board. An optional board contains all disk-controller electronics. These elements are packaged, together with the selected disk storage units, in a lectern, mounted on the same pedestal that carries the fully adjustable display unit. Floppy disks are dropped in the top of the lectern "toaster style." The keyboard is detached from the unit and can be placed in any location around the work space within reach of a 5-foot coiled cable.

The units can stand alone or may be inter-connected into a local network via a high speed data link, sharing peripherals and data bases, but not processing power.

Workstation hardware and software architecture are modularly designed to offer selective application entry points and multiple growth paths. A standalone system can be upgraded to a local network without software modification.

The AWS family consists of four members. The AWS-210 supports from 128k to 512k of RAM, has no mass storage devices and may be used only as a cluster station. The AWS-220 supports from 128k to 512k and one mini-floppy unit with a formatted capacity of 315k. It can be used as a standalone system or as a cluster station. The AWS-230 supports from 128k and two mini-floppy units with a total formatted capacity of 630k. It can be used as a standalone system or as a cluster station with local mass storage. The AWS-240 supports from 256k to 512k and a mini-floppy and mini-Winchester unit with a total formatted capacity of 5.3Mb. This may be used as a standalone system, as a master station or as a cluster station.

Pricing ranges from $3990 to $11,500.

For more information: Convergent Technologies, 2500 Augustine Dr., Santa Clara, CA 95051; (800) 538-7560. **CIRCLE 206**

BOARDS

16k Expansion

The 16 Plus Board expands the memory of the Radio Shack Color Computer from 16k to 32k. It does not require soldering and plugs in and fits under the RF shield cover inside the computer.

The board's design allows the graphics display to reside anywhere

RAM+

Expansion Memory for

IBM Personal Computer

- Every RAM + card has an RS-232 serial port which uses IBM supplied software.
- Every RAM + card has sockets for up to 256K of memory.
- Available in 64K, 128K, 192K, 256K. Priced from $475 to $1075. 64K expansion kits available—$210.
- Fully assembled, tested, guaranteed 90-days.

Call for location of nearest dealer
(Dealer queries solicited)

SEATTLE COMPUTER

1114 Industry Dr. Seattle WA 98188

Information hotline — 206/575-1830

CIRCLE 62

within the 32k of memory. No software modifications are required for existing software and the board makes the computer compatible with anticipated disk systems.

The price is $84.95.

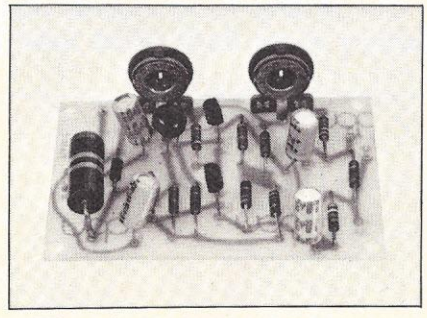
For more information: Computerware, Box 668, 1472 Encinitas Blvd., Encinitas, CA 92024; (714) 436-3512. **CIRCLE 207**

Video Conversion

The ACVM-2 is a receiver/monitor conversion kit that permits operation in either a monitor or receiver mode by selecting switch position.

The kit can be installed in either black-and-white or color sets and permits the user to obtain high-resolution displays of up to 80 characters per line.

It is a direct video modification which, in the monitor mode, bypasses the tuner and I.F. sections of a conventional receiver set and provides a high quality display.



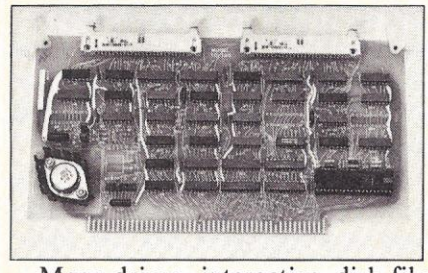
The price is $34.95.

For more information: V.A.M.P., P.O. Box 411, Los Angeles, CA 90028; (213) 466-5533. **CIRCLE 208**

S-100 Bus Interface

The Model TC-100 interface card and implementating software permits the attachment of industry standard ½" magnetic tape drives to S-100 bus computers.

The interface is designed to facilitate backup of Winchester technology disk drives with high capacity ½" IBM compatible streaming tape drives. It operates on 2 or 4 Mhz systems with tape drives from 12.5 to 125 ips (drive dependant).



Menu-driven, interactive, disk file backup software with volume selection, file dating and encryption, operating under CP/M 2.2 is included in the package. Other software includes FORTRAN driver and general tape

ADVENTURES!!!

For TRS-80 and COLOR-80. These Adventures are written in BASIC, are full featured, fast action, full plotted adventures that take 30-50 hours to play. (Adventures are interactive fantasies. It's like reading a book except that you are the main character as you give the computer commands like "Look in the Coffin" and "Light the torch.")

Adventures require 16K. They sell for $14.95 each.

ESCAPE FROM MARS (by Rodger Olsen)
This ADVENTURE takes place on the RED PLANET. You'll have to explore a Martian city and deal with possibly hostile aliens to survive this one. A good first adventure.

PYRAMID (by Rodger Olsen)
This is our most challenging ADVENTURE. It is a treasure hunt in a pyramid full of problems. Exciting and tough!

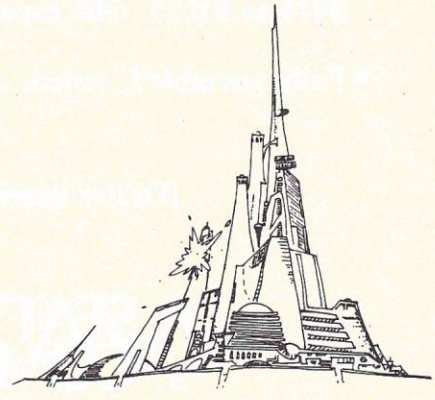
TREK ADVENTURE (by Bob Retelle)
This one takes place aboard a familiar starship. The crew has left for good reasons - but they forgot to take you, and now you are in deep trouble.

DEATH SHIP (by Rodger Olsen)
Our first and original ADVENTURE, this one takes place aboard a cruise ship - but it ain't the Love Boat.

VAMPIRE CASTLE (by Mike Bassman)
This is a contest between you and old Drac - and it's getting a little dark outside. $14.95 each.

QUEST

QUEST - A NEW IDEA IN ADVENTURE GAMES! Different from all the others. Quest is played on a computer generated map of Alesia. Your job is to gather men and supplies by combat, bargaining, exploration of ruins and temples and outright banditry. When your force is strong enough, you attack the Citadel of Moorlock in a life or death battle to the finish. Playable in 2 to 5 hours, this one is different every time.
16K COLOR-80 OR TRS-80 ONLY. $14.95



ARCADE AND THINKING GAMES
16K and extended or level II BASIC

TIME TREK, REAL TIME REAL GRAPHICS TREK. See the torpedoes fly and Klingons explode. No more scolling displays, no more turn taking. – This one has real time and real displays. In BASIC – for 16K level II or extended color BASIC. $14.95.

STARFIGHTER – This one man space war game pits you against spacecruisers, battlewagons, and one man fighters. You have the view from your cockpit window, a working instrument panel, and your wits. Another real time goody. $9.95.

BATTLEFLEET – This grown-up version of Battleship is the toughest thinking game available on 80 computers. There is no luck involved as you seek out the 80's hidden fleet. This is a topographical toughie. $9.95.

SLASHBALL – A two player game of strategy and skill, this is like nothing you have ever seen before. This takes fast fingers, quick wits and concentration. Playable from age 6 to 65, it is a good family game. $9.95.

MINOS - 8K – Features amazing 3D graphics. You see a maze from the top, the screen blanks, and when it clears, you are in the maze at ground level finding your way through on foot. Realistic enough to cause claustrophobia. $12.95. (COLOR-80 ONLY)

Please specify system on all orders

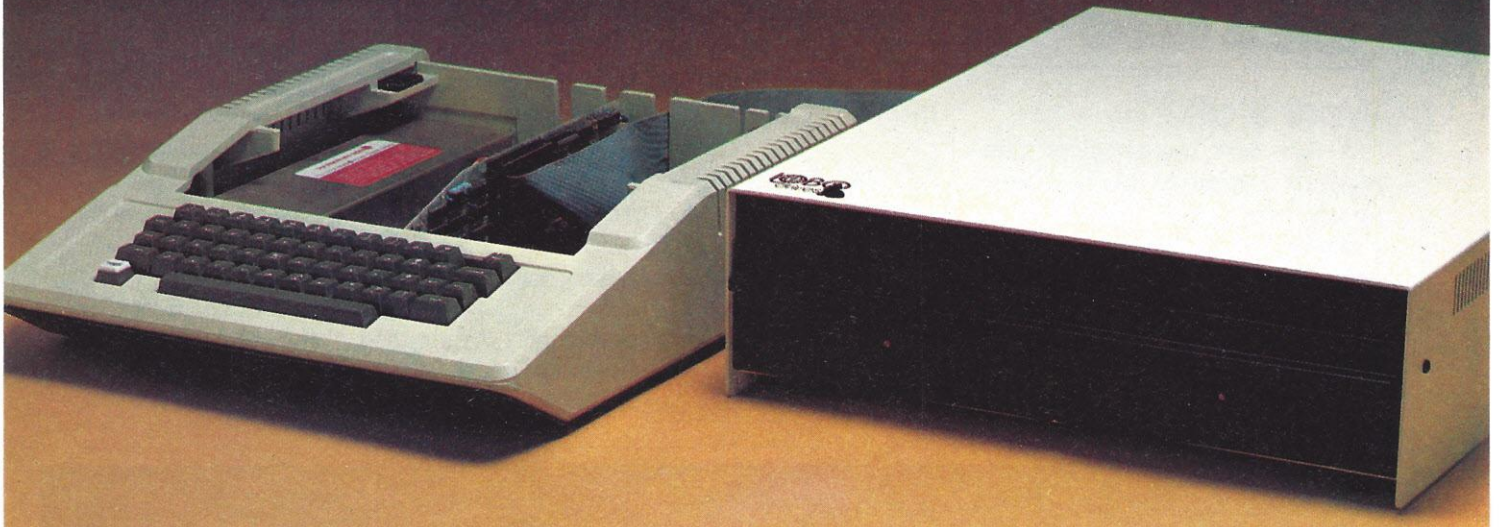
This is only a partial listing of what we have to offer. Send for free catalog to:

AARDVARK - 80
2352 S. Commerce, Walled Lake, MI 48088
(313) 669-3110

TRS-80 **COLOR-80**

CIRCLE 32

4.4 MEGABYTES FOR YOUR APPLE



Double-Sided, Double-Density 8-Inch Drive Capability is Here ... Now!

The new LOBO DRIVES Model LCA-22 Double Density Floppy Disk Controller has been specifically designed to match your APPLE® to the new double-sided, double-density 8-inch floppy disk drives. Now, you can add up to four 1.1 Megabyte drives (4.4 Megabytes total) and realize all the power and potential of your APPLE computer.

Completely Software transparent, the Model LCA-22 will plug into any chassis slot. You are no longer restricted to slot 7. And, the Model LCA-22 is fully compatible with 3.3 DOS and PASCAL. CP/M will be available soon.

LOBO's new LCA-22 Disk Controller and full line of field-proven, high-reliability disk drives (all LOBO products come with a one year, 100% parts/labor warranty) are available at computer retail stores nationwide. Stop in and see a demonstration at your local dealer today.

LOBO drives INTERNATIONAL

LOBO DRIVES INT'L
354 South Fairview Ave.
Goleta, CA 93117
(805) 683-1576

I'm looking to expand my APPLE. Please send me more information on:

- ☐ Model LCA-22 Disk Controller
- ☐ Floppy Disk Drives
  - ☐ 5¼-inch
  - ☐ 8-inch
- ☐ Fixed Disk Drives
  - ☐ 5¼-inch
  - ☐ 8-inch
  - ☐ 14-inch

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____
(area code)

CIRCLE 15

utilities such as a universal tape dump displaying block length, hex and ASCII characters, and file marks.

The price is $1350.

For more information: Overland Data, 1425 Monte Rico Dr., El Cajon, CA 92021; (714) 447-1908.

CIRCLE 209

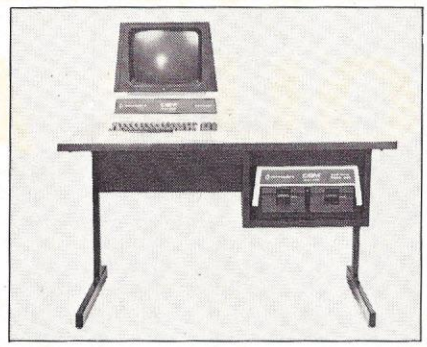
BITS & PIECES

Work Station

A new desk system gives Commodore computer users a comfortable work station. The desks are designed to be ergonomically sound without sacrificing aesthetics.

Four of these guidelines include keyboard height, screen angle, eye-to-screen distance and overall height.

The price is $299.



For .more information: Interlink, Box 134, Berrien Springs, MI 49103; (616) 473-3103. **CIRCLE 210**

Music Synthesis

Orchestra-85, a software/hardware product, synthesizes stereo music and provides percussion on the TRS-80.

Stereo separation is by instrument, allowing the user to play trumpet and oboe simultaneously while playing clarinet and organ. A wide range of percussive sounds and special effects may also be obtained. The software supports five-part harmony for use with 2.66, 3.54 and 4.0 Mhz clock speeds.

Songs are easily transcribed from sheet music using the system's full-screen text editor, or they can be downloaded from bulletin-board systems.

Orchestra-85 includes tape and disk versions plus sample music files on cassette, and an instruction manual. It is fully assembled and contains a tested PC board which plugs into any 16k TRS-80 Model I Level II keyboard or expansion interface.

The price is $129.95.

For more information: Software Affair, 858 Rubis Dr., Sunnyvale, CA 94087; (408) 295-9195.

CIRCLE 211

Select a modem for your computer... easy as ABC.

CHOOSE A. The Smart One™, Model AM232, with its own built in microcontroller. Auto Dials, Auto Answers, Auto Modes (originate/answer), "Direct Connect" for *any* computer with an RS232 interface . . . **$299.00.**

CHOOSE B. The Acoustic Modem, Model AMII/A, for the Apple*. Comes complete with a powerful operating system. Supports 25 easy to use keyboard commands and operates interactively with your programs. No interface card required! . . . **$179.00.**

CHOOSE C. The "Direct Connect" Modem, Model AMII, for the Apple*. Comes complete with a powerful operating system. Supports Auto Dial, Auto Answer, 27 easy to use keyboard commands and operates interactively with your programs. No interface card required! . . . **$289.00.**

Be a part of the information revolution. It's fun, exciting, informative, educational. Call or write your order today. COD's accepted.

MICROMATE ELECTRONICS, INC.

2094 Front Street • East Meadow, New York 11554 • Telephone 516.794.1072

All "Direct Connect" modems are FCC certified. *Registered trademark of Apple Computer, Inc.

CIRCLE 63

NEED A PRINTER?

UP TO 25% DISCOUNTS! — SAME DAY SHIPMENT!

SALE

CENTRONICS 739

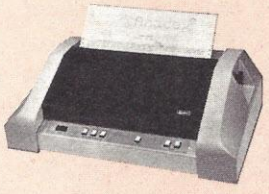
With Graphics and Word Processing Print Quality

• 18 x 9 dot matrix; suitable for word processing • Underlining • proportional spacing • right margin justification • serif typeface • 80/100 CPS • 9½" Pin Feed/Friction feed • Reverse Platen • 80/132 columns • Top of form

CENTRONICS 739-1 (Parallel) ..... (List $955) **$Call**
CENTRONICS 739-3 (Serial) ..... (List $1045) **$815**
GRAPPLER™ Apple graphics interface ..... **$Call**

ANADEX

Dot Graphics, Wide Carriage

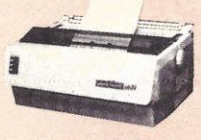


• 11 x 9 dot matrix; lower case descenders • Dot resolution graphics • Bi-directional, logic seeking • Up to 200 CPS • RS 232 Serial & Parallel • Forms control • X-ON/X-OFF • Up to 6 part copy.

ANADEX 9501/9500..... (List $1650) **$ Call**
GRAPPLER™ Apple graphics Interface ..... **$ Call**

C. ITOH STARWRITER

Daisy Wheel Letter Quality



• 25 CPS (Optional 45 CPS) • Typewriter quality • Centronics parallel • RS 232 Serial (Optional) • Proportional spacing • Bidirectional • Programmable VFU • Self test • Diablo compatible • Friction feed (Optional tractors) • 136 printable columns • Manufactured by TEC.

C. ITOH STARWRITER ..... (List $1895) **$1525**

SUPER PRICES

IDS PAPER TIGERS

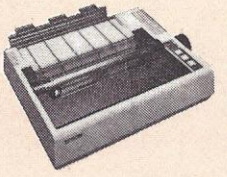
Dot Resolution Graphics, quality print, speed

9 wire printhead (460) with lower case descenders • Over 150 CPS • bi-directional, logic seeking • 8 character sizes; 80-132 columns • Adjustable tractors • High-resolution dot graphics • Proportional spacing & text justification

IDS 460G 9 wire printhead, graphics ..... (List $1094) **$Call**
IDS 560G wide carriage, graphics ..... (List $1394) **$Call**
IDS PRISM Color Graphics Printer..... (List $1995) **$ Call**
GRAPPLER™ Apple graphics interface ..... **$Call**

EPSON MX80/MX70/MX100

Low-Priced Professional Print Quality



• 9 x 9 dot matrix • Lower case descenders • 80 CPS • Bidirectional, Logic seeking • 40, 66, 80, 132 columns per line • 64 special graphic characters: TRS-80 Compatible • Forms handling • Multi-pass printing • Adjustable tractors

We also carry a full line of Epson Accessories.

EPSON MX80 (& MX80FT) ..... (List $645) **$Call**
EPSON MX70 Dot graphics, 5 x 7 matrix ..... (List $450) **$Call**
EPSON MX100 wide carriage, graphics..... (List $945) **$Call**

GRAPPLER™ Apple Graphics Interface ..... **$ Call**

GRAFTRAX 80 - MX80 Dot Graphics ..... **$ 95**

NEW

NEC 8023 DOT MATRIX

Dot graphics • 100 CPS • Bi-directional, logic-seeking • Tractors & friction feed • 5-Alphabet fonts • 8 character sizes • Proportional spacing

NEC 8023 DOT MATRIX..... (List $795) **$ Call**

NEC SPINWRITER

High Speed Letter Quality

• 55 CPS • Typewriter quality • Bidirectional • Plotting • proportional spacing.

7710 RO, Serial ..... (List $3055) **$2575**
7730 RO, Parallel ..... (List $3055) **$2575**

TELEVIDEO CRT'S

AT DISCOUNT PRICES!

QUANTITY PRICING AVAILABLE

TVI 910
TVI 912C
TVI 920C
TVI 950

Please Call Toll Free Prices are too low to advertise

CRT'S

ADDS VIEWPOINT ..... (List $ 699) **$ 600**

PRINTERS

MALIBU 200 wide carriage, graphics, letter quality (List $2995) **$ Call**
QUME SPRINT 9..... **$ Call**
DIABLO 630 ..... **$ Call**
ANACOM 150..... (List $1350) **$ Call**

INTERFACE EQUIPMENT

EPSON ACCESSORIES..... **$ Call**

TRS-80 CABLES to keyboard or Exp. interface ..... **$ Call**
NOVATION D-CAT direct connect modem..... **$ 180**
HAYES MICROMODEM (Apple II)..... **$ Call**

CALL FOR INFORMATION & CATALOG

(800) 854-8275

CA, AK, HI (714) 630-3322

RETAIL PRINTER STORES:

Store #1 3150 E. La Palma, # I, Anaheim, CA (714) 630-3622
Store #2 13604 Ventura Bl., Sherman Oaks, CA (213) 501-3486

Store Hours: M-F 10-6 Sat. 10-4

Copyright © 1981 by Orange Micro, Inc.

CIRCLE 64

Orange Micro inc.

3150 E. La Palma, Suite G, Anaheim, CA 92806

"The Computer Printer Specialists"

master charge VISA AMERICAN EXPRESS

Phone order WELCOME; same day shipment. Free use of VISA & MASTERCARD. COD's accepted. Manufacturer's warranty included on all equipment. Prices subject to revision.

Financial analysis and modeling for Apple III

Desktop/PLAN III enables users to do financial analysis and modeling on the Apple III personal computer. The program takes full advantage of the extra internal memory, higher resolution graphics, five-million bytes of hard-disk mass storage, and other features of the recently improved Apple III, according to the software's manufacturer, Personal Software.

Desktop/PLAN III can handle financial models of large size and can automatically consolidate submodels into master models. It also allows flexible report formatting; has onboard graphics; and can incorporate customized, user-written calculations rules which the master program can use.

The program is menu driven, prompting the user through the process of describing, designing and executing a financial model. It makes use of the Apple III keyboard, 80-character upper- and lowercase display screen and the computer's Sophisticated Operating System (SOS).

Desktop/PLAN III comes with two model files which can be examined and altered by the user: a PERT chart example and a capital-investment sample model. It also comes with sample files for the fictional "Topnotch Manufacturing Company," with which the user can learn and experiment.

The computer ledger pad has 8000 row-and-column locations. The user specifies the number of columns across, and the program calculates how many rows deep the maximum model may be. Up to 300 columns across may be specified.

Calculation abilities include up to 20 different "custom calculation rules" including program "looping" and if/then logic.

Because the program stores calculation rules, starting values and com-

micro lab presents a TAXSAVER

Buy the TAX·MANAGER and turn your apple into a tax deduction.

Let the Tax Laws work for you - buy the TAX·MANAGER and deduct the Apple and the Program

Use The Tax-Manager to help you prepare your taxes. Then include the cost of this program and part of the cost of your computer as a deduction.

You don't have to be an accountant to understand it. Simply enter your tax information into this easy-to-use program. Then sit back and relax while it quickly computes the information and prints most of your federal income tax schedules. Get The Tax-Manager now and start the new year with your taxes under control.

When tax laws change, don't be concerned. The Tax-Manager will never be outdated. With Micro Lab's Extended Warranty Plan ($30 a year) you can update to the current version at no additional cost. You will not have to reinvest more money in a new program. The Tax-Manager, which is the first of the Micro Lab Tax Saver group, will keep you current.

THE TAX-MANAGER IS NOW AVAILABLE AT THE INTRODUCTORY PRICE OF $150.

micro lab
systems that work

2310 Skokie Valley Road
Highland Park, IL 60035 • 312-433-7550

© 1981, Micro Lab, Inc.
Apple is a trademark of Apple computers, Inc.

CIRCLE 65

The confidence builder.

Micro-DSS™/FINANCE gives managers the powerful financial software they need. Plus microcomputer convenience and economy.

With Micro-DSS™/FINANCE financial managers can dare to experiment. They can see what would happen if inflation continues at 12% or interest rates drop to 15%. They can ask numerous "what if" questions, consider their options—and confidently support their decisions.

Because for the first time Micro-DSS™/FINANCE gives the microcomputer user the power and features of large computer systems and time-sharing. At a fraction of the cost.

And it gives the potential micro user in both large and small companies a reason to turn to microcomputers—a full scale financial support system that's easy to use, readily available, secure, and flexible. In short, a system that doesn't compromise.

Micro-DSS™/FINANCE features:

- Many built-in financial functions—including depreciation, net present value, internal rate of return and amortization.
- Powerful editing and report writing features that make "what if" analysis and financial reporting easy.
- An automatically generated worksheet with blanks showing where data are needed to calculate the results of the model.
- Built-in graphics with a unique feature—you can retain them for later replay as a "slide show" on the monitor.
- Introductory Guide and User Reference Manual written for people with no computer experience.
- Model can run automatically once it is set up, so a person with no computer skills can run models and reports someone else has created.
- Full user support service

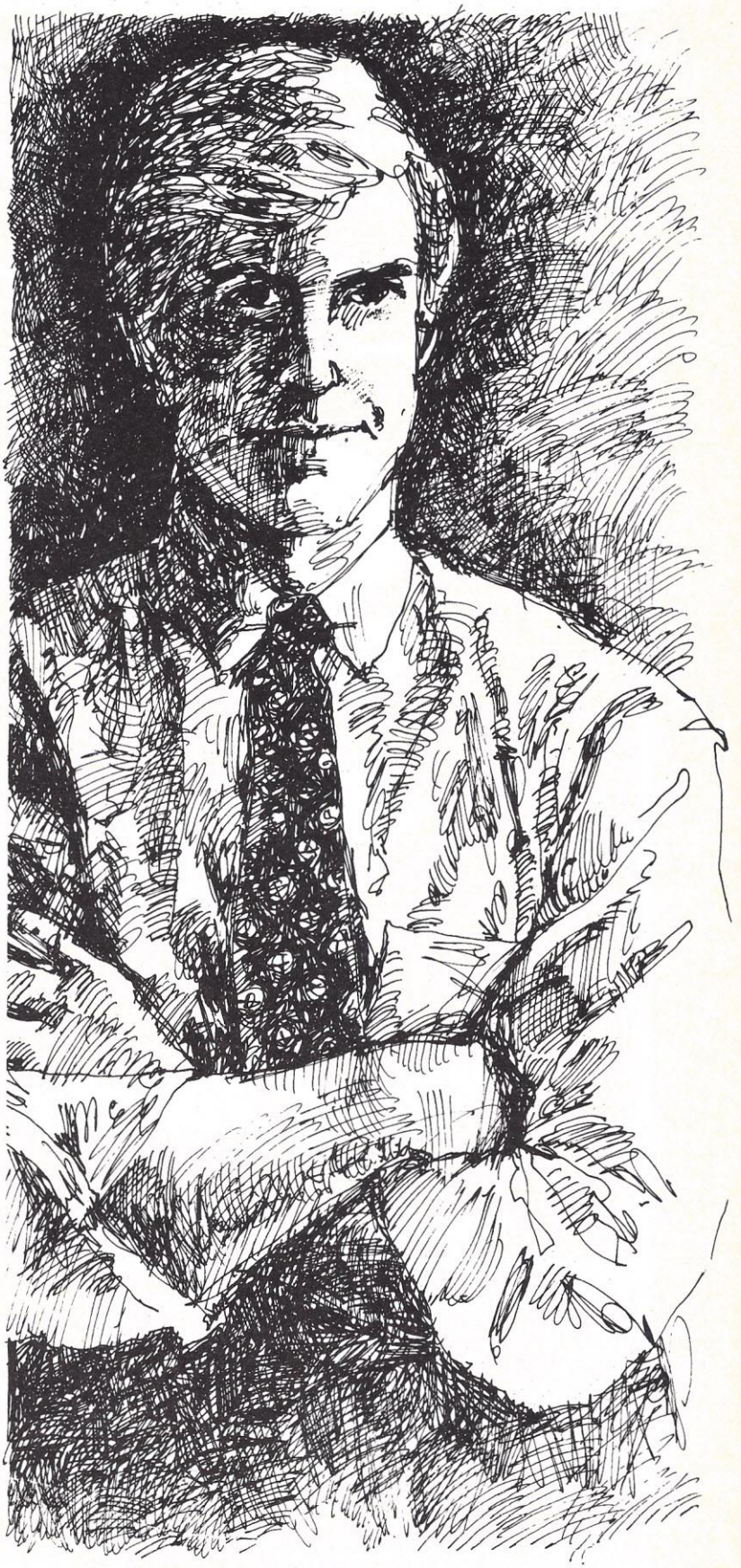
The Apple II Version of Micro-DSS™/FINANCE requiring 48K and Pascal is available now. Suggested retail U.S. price is $1,500.

For more information (including a list of dealers near you), please write to:

Addison-Wesley Publishing Company
Software Marketing, Dept. O/P87
Reading, Massachusetts 01867

Micro-DSS is a trademark of Addison-Wesley Publishing Company, Inc.

Apple II is a trademark of Apple Computer, Inc.



CIRCLE 18

puted model values on disk, it can consolidate identical submodels into one larger model, and transfer individual lines from other models into a summary model.

In addition to plotting bar graphs and line charts from Desktop/PLAN III data, another type of graph may be displayed which allows up to four rows of values to be line-graphed and overlayed on a single display.

The program requires an Apple III 128k system, at least one storage device external to the computer, a hard-copy printer and a video display. The price is $300.

For more information: Personal Software, 1330 Bordeaux Dr., Sunnyvale, CA 94086; (408) 745-7841. **CIRCLE 212**

At last!

an application that interests everyone ..... with a manual everyone will love

Our Application:

Money. Where does it come from? Where does it go? How much do you have and how much can you afford to spend . . . You're interested . . . Your spouse is interested . . . Your accountant is interested . . . The taxman is interested . . . MONEY MAESTRO provides the answers. Quickly. Accurately.

Our Manual:

That's it. No long dry manuals to read. No jargon. If it isn't obvious what you need to do next, just press "?" (followed by RETURN) and MONEY MAESTRO will lead the way. Of course we give you a manual to page through if you choose, but if you have a computer and can fill out a check . . . you can run MONEY MAESTRO without opening the book.

Money Maestro™

Now runs on APPLE !

For MONEY MAESTRO Home Banking System, mail to:
InnoSys Inc., 2150 Shattuck Ave., Berkeley, CA 94704, (415) 843-8122

Name _____
Address _____
City _____ State _____ ZIP _____

I'm Interested!
☐ User's Manual ($20.00)
☐ dealer info

☐ Apple (DOS)
☐ Apple (softcard)
☐ 8" CP/M ☐ N★5¼"
☐ 5¼" Micropolis

I'm Sold!
☐ MONEY MAESTRO ($200.00)

Payment: ☐ COD ☐ check enclosed amount $ _____
☐ Visa/Mastercharge # _____ exp. date __/__

Signature _____

Allow $3.00 Shipping & Handling (overseas: $10.00).
California residents add sales tax.

"today's idea . . .
. . . tomorrow's utility"

InnoSys INCORPORATED

CIRCLE 31

BUSINESS

Simplifying Budgets

MicroPlan is a financial modeling program developed to reduce forecast and budgeting functions into a 15-minute task.

The program is designed for push-button use and requires no typing skills. Each step in using MicroPlan is similar to computing with a calculator, so no formulas need be entered into the computer. Commands are displayed on the CRT for reference.

Features include: internal rate of return, four depreciation types, three loan types, ability to build interlinked multi-stage models, and a full featured report generator and graphics package.

The price is $495.

For more information: Data Technology Industries, 700 Whitney St., San Leandro, CA 94577; (415) 638-1206. **CIRCLE 213**

Financial Modeling

Bestplan, a financial modeling system, allows the user to describe a financial worksheet in a non-computer type language, and develop complex final reports on a hard-copy printing device.

The software provides full row and column editing and formatting, extended business math functions, including various depreciation schedules, internal rate of return, mortgage schedules, as well as complete labeling and titles along with footnotes.

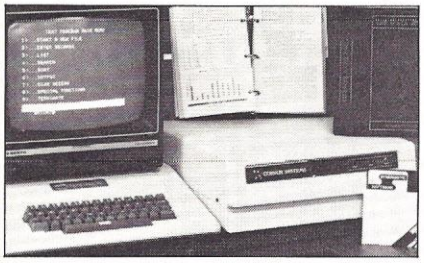
Bestplan operates under the

OASIS operating system and is priced at $495.

For more information: Best Company, 30192 Via Borica, Palos Verdes, CA 90274. **CIRCLE 214**

Data Management

The Data Reporter, available for the Apple II using floppy or hard disk drives, includes a database, a report generator, a plotter/analyzer program, calculator capabilities, and a variety of utilities, all designed to work together on common data files.



The software can be customized to particular data storage, access and manipulation requirements. The user can create his own database, inventory control, accounts receivable, sales analysis, bibliography and memo programs. The program's text editor lets the user design and print letters, reports, documents, and contracts.

Data Reporter requires 48k, Applesoft, at least one disk and DOS 3.3. It is priced at $220.

For more information: Synergistic Software, 5221 120th Ave., S.E., Bellevue, WA 98006; (206) 226-3216.

CIRCLE 215

EDUCATIONAL

Reading Series

The High Motivation Reading Series of educational products is based on motivational reading materials for grades 4–6, using an illustrated format. The series provides four student readers, a read-along audio cassette, a teacher's manual and a computer program (written in TRS-80 PILOT

Turn your TV into a time-sharing videotex display for $399.*

Now you can connect your family to the informative and entertaining world of CompuServe, The Source, Dow Jones News/Retrieval and other time-sharing and data-base networks.

All you need is the RCA VP-3501 Videotex Data Terminal (with built-in modem and RF modulator), your telephone and your TV set. You can get instant access to regional newspapers and newsletters...weather reports and sports results...computer games and more. You can use the VP-3501 to make airline reservations...find restaurant recommendations in cities around the world. Plus stock market and corporate data. Or access your school or business computer. You can even send electronic mail and buy products.

In addition to information retrieval, the VP-3501 provides full interactive communications with a host computer. What you have working for you is a versatile, feature-packed interactive data terminal which can be worth far more to you than its low price. Its unique color-locking circuitry gives you sharp color graphics and rainbow-free characters. You get 20- and 40- character formats in one of eight foreground colors and separate color backgrounds.

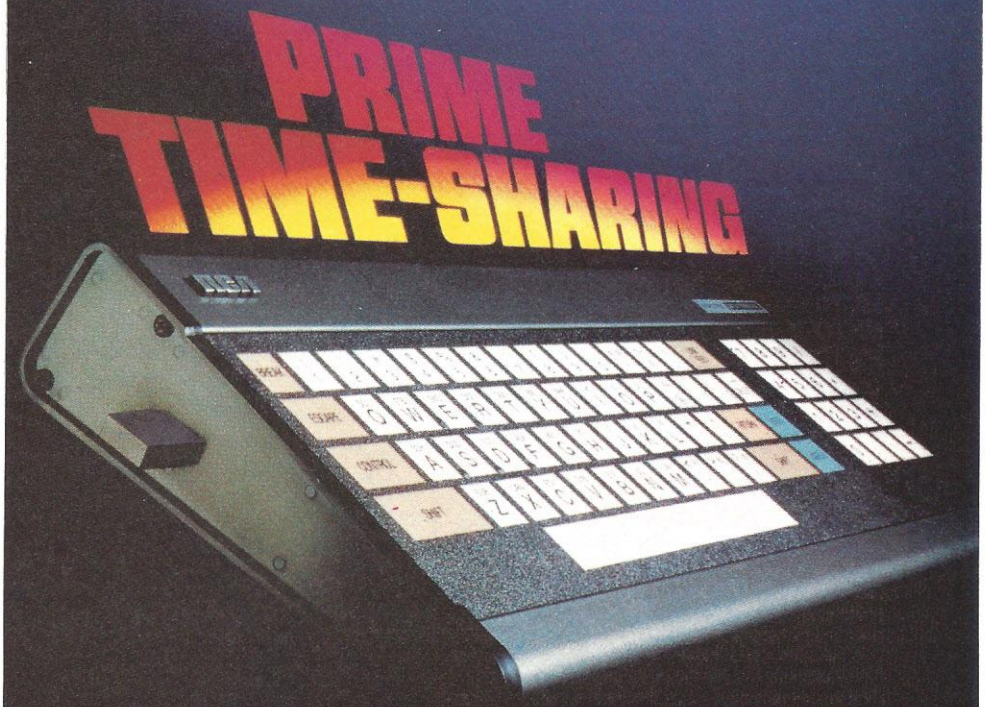
With reverse video, you can emphasize certain letters, words, or sentences. A built-in tone generator...plus a white noise generator...let you create everything from the sound of explosions to the sound of music. The spill-proof, easy-to-clean keyboard is highly suitable for hostile environments. And its membrane key switches give you a natural feel.

The VP-3501 is truly a fine Videotex Data Terminal. And don't forget, it's made by RCA...the first name in television...now the foremost name in videotex terminals.

See a demonstration at your computer or electronics dealer, or contact RCA. Order now and you'll get a free password and a free hour's time-sharing on both CompuServe and Dow Jones News/Retrieval! (Limited time offer.)

For more information or to order, call toll-free. 800-233-0094. (In Pennsylvania, call 717-393-0446.) Visa or MasterCard orders accepted by phone. Or send a check including $3.00 delivery charge plus your local sales tax to RCA MicroComputer Products, New Holland Avenue, Lancaster, PA 17604.

*Suggested User Price.



RCA

CIRCLE 115

APPLE TREE
ELECTRONICS

A harvest of savings from Apple Tree Electronics!

SOFTWARE

A full line of software for business, games and education at **15% off!**

HARDWARE

	List	Our Price
32K RAM card	$293.00	$205.00
Video Term	$345.00	$279.00
Lazer Products	– – – 20% off – – –	

DISKS

Maxell	Box of 10, 5¼", SS-DD	$35.00
Verbatim	Box of 10, 5¼", SS-DD	$29.00

DRIVES

CORVUS	List	Our Price
5 MBYTES	$3,750.00	$3,050.00
10 MBYTES	$5,350.00	$4,449.00
20 MBYTES	$6,450.00	$5,325.00

MONITORS

LE MONITORS	List	Our Price
9" Green	$189.00	$159.00
12" Green	$199.00	$169.00
ZENITH		
12" Green	$179.00	$129.00

Plus a full line of **AMDEK** Monitors

PRINTERS

PAPER TIGER	List	Our Price
460G	$1,094.00	$950.00
560G	$1,394.00	$1,250.00
EPSON		
MX 70	$449.00	$395.00
MX 80FT	$745.00	$595.00
MX 100FT	$945.00	$795.00

VISA (702) 452-5589 MasterCard

P.O. Box 18432
Department 4PC
Las Vegas, Nevada 89114

Phone orders welcome. Mail orders may send charge card number (include expiration date), cashiers check, money order or personal check (allow ten business days for personal or company checks to clear). Add $3.00 for shipping, handling and insurance. Nevada residents add 5.75% sales tax. Please include phone number. All equipment is in factory cartons with manufacturers warranty. Equipment subject to price change and availability. Call or write for price list.

CIRCLE 66

SOFTWARE UPDATE

Plus) to measure comprehension in several skill areas.

Titles in the series include Charles Lindbergh/Amelia Earhart, available for $64.95; Hound of the Baskervilles, Dracula, Moby Dick, The Beatles/John Lennon and 20,000 Leagues Under the Sea, available for $59.95 each.

Each story involves computer-based activities and gives practice in vocabulary and reading comprehension, including understanding main ideas, sequence of events, details and separating facts from opinion. Test information is recorded for the teacher's review.

The series requires a TRS-80 32k Model I with the lowercase option and at least one disk drive, and TRS-80 PILOT Plus, available for $79.95.

For more information: Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102. **CIRCLE 216**

UTILITY

Character Set

A programmable character set and gamegraphics editor on cassette is now available for users of the VIC 20 personal computer.

The character-set editor comes with a 16-page instruction manual and allows users to create groups of 64, 128 or 192 programmable characters at a time and use them in BASIC programs. Each group of characters takes only one-half kilobyte of program space.

With the new character editor, VIC 20 users can create their own character set and easily modify letters, numbers and graphics to include foreign language letters, mathematic and scientific symbols or special "arcade" game graphics.

It also allows users to save their newly-created character set on tape or disk for future use, and then insert the set in a BASIC program.

The price is $14.95.

For more information: Commodore Business Machines, Computer Systems Division, 681 Moore Rd., King of Prussia, PA 19406; (215) 337-7100. **CIRCLE 217**

Information Management

DataFax is designed to allow the user to enter and access information according to individual needs, without programming.

The program allows the user to enter data in any form and to retrieve it in an individual way, eliminating the constrictions of set programs. Each screen of information can be cross-referenced or categorized by any word or words. Individual screens are retrieved by the keywords. Screens may be chained together if necessary and a hard copy may be obtained.

The program is written in Pascal and runs on the Apple II. The price is $250.

For more information: Link Systems, 1655 26th St., Santa Monica, CA 90404; (213) 453-1851. **CIRCLE 218**

COMMUNICATION

Communication Lines

Micro-Telegram allows Apple owners to access Western Union services worldwide. Besides sending mailgrams, Apple users can send and

Competition Classics!

By Dan and Kathe Spracklen

SARGON II
The great computer chess game!

REVERSAL
A challenging strategy duel!

Available at your local computer store

For Orders and Inquiries Call Toll Free

HAYDEN HOTLINE 800-631-0856

Hayden Book Company, Inc.

50 Essex Street, Rochelle Park, NJ 07662

CIRCLE 60

Best-looking Apple UPPER/lowercase you've ever seen! And for just $49.95

PowerCase from Beaman Porter.

Chip and software give you complete UPPER/lowercase capability. Try it at our risk for a full 30 days!

An actual photograph of our Character Set

```
 !"#$%&'()*+,-./
0123456789:;<=>?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]↑_
`abcdefghijklmno
pqrstuvwxyz{|}~□
```

- Full 96-character ASCII set.
- Graphics judged *best* by experts. Clear, crisp characters, with true lowercase descenders.
- Superb readability. Provides new clarity for Visicalc.* (*TM Personal Software, Inc.)
- Software diskette (included) assures full typewriter functions with shift key plus shift lock.
- Supports Apple PASCAL and DOS 3.3 or 3.2
- Comprehensive manual makes PowerCase simple to install, a snap to operate.
- No soldering required. You need only a screwdriver. Installation will *not* invalidate your Apple Warranty.
- For all Apple II and Apple II+ systems at revision level 7 or greater, with at least 48K of memory.
- Instant response to your order. We ship prepaid at once.
- 30-day trial at our risk! Money back by return mail—without quibble—if you're not pleased. Just return the undamaged PowerCase system.

BEAMAN PORTER, INC.
High Performance Computer Products
Pleasant Ridge Road, Harrison, NY 10528
(914) 967-3504

BEAMAN PORTER, INC.
Pleasant Ridge Road, Harrison, NY 10528

☐ Send_____complete PowerCase system(s) @ $49.95 (prepaid).

☐ Send 2-sided diskette(s) for PASCAL and DOS 3.3 with my system(s).

☐ Send diskette(s) for DOS 3.2 with my system(s).

(N.Y. residents add appropriate sales tax)

☐ My check or money order for $_____enclosed.
Or bill $_____to my:

☐ Mastercard ☐ Visa
(Mastercard only, list 4 digits above your name:_____.)

Card No._____ Exp. Date_____

Signature_____ Date_____

Name _____

Street _____

City, State, ZIP_____

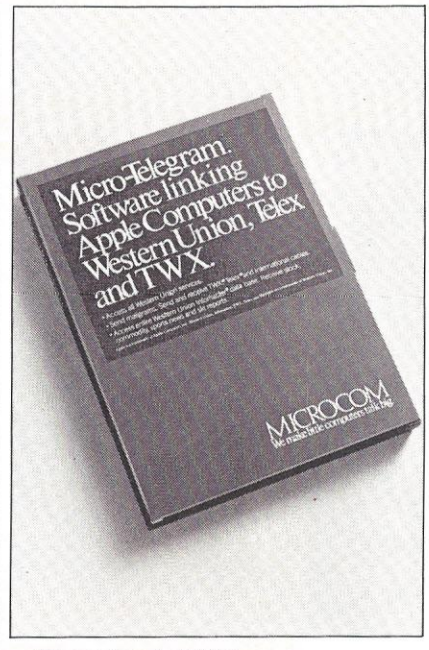
I understand I must be pleased or Beaman Porter, Inc. will refund my payment in full, when I return my undamaged PowerCase system(s) anytime within 30 days of purchase.

Also available through selected dealers.
CIRCLE 68

SOFTWARE UPDATE

receive TWX, Telex and international cables.

The software gives access to the continuously updated reports on news, stock, foreign exchange, gold, futures, sports reports and ski conditions available through Infomaster, the Western Union data base. It also permits editing on the screen, automatic transmission of messages, computer-stored subscriber lists and directories.



The price is $250.

For more information: Microcom, 89 State St., Boston, MA 02109; (617) 367-6362. **CIRCLE 219**

Information Service

TEXNET, the home information and communications service developed by Source Telecomputing, is now "on-line" for users of the TI home computer. The new subscription service is available over telephone lines coupled to the TI home computer via available TI accessories.

The service offers more than 1200 information services of The Source, plus a variety of new services that take advantage of the color, graphics, sound, music and speech capabilities of the home computer. In addition, it includes text-to-speech capability that allows users to hear any message typed on the keyboard or transmitted over the TEXNET system.

Equipment required includes the Terminal Emulator II solid state software command module, a solid state speech synthesizer, an RS-232 interface module and the TI telephone coupler.

The cost of the service is a one-time subscription fee of $100 plus a $10 minimum monthly charge. The "on-line" charges are $18 per hour from 7 a.m. to 6 p.m., $5.75 per hour from 6 p.m. to midnight and during the day on weekends, and $4.25 per hour from midnight to 7 a.m.

For more information: Texas Instruments, Consumer Relations, P.O. Box 53, Lubbock, TX 79408. **CIRCLE 220**

Communications Link

Micro-Link, for the Osborne 1, is designed for the novice computer user and supports communication with bulletin boards, information retrieval services, as well as send and receive files from other computers.

Files may be prepared in advance and transmitted automatically. The entire two-way record of communication may be recorded in memory and on diskette.

Features include a readable word-wrapped display fitted to any screen width, and simple, fast user commands. Micro-Link supports originate and answer mode, full and half-duplex, and operates at 300 baud. Files may be transmitted in character, line or memory-block protocol.

The software requires a Z80 or 8080-based computer system with serial port and standard RS-232 modem. The price is $89.

For more information: Osborne Computer, 26500 Corporate Ave., Hayward, CA 94545; (415) 887-8080. **CIRCLE 221**

SOFTWARE OF THE MONTH CLUB™

Software of the Month Club™ a revolutionary new way to buy name brand software. Available only through Microcon SoftwareCenters, the "Unhardware" Store. Choose from these front-line products at 10% to 33% discounts and purchase two more over the next six months at similar savings.

APPLE SOFTWARE OF THE MONTH FEATURE PRODUCTS FOR FEBRUARY

ENTERTAINMENT	RETAIL	MEMBER PRICE
Adventure 1, 2, 3	$39.95	$26.95
Adventure 4, 5, 6	39.95	26.95
Adventure 7, 8, 9	39.95	26.95
Adventure 10, 11, 12	39.95	26.95
Eliminator	29.95	23.95
Planetoids	19.95	15.95
Mystery House	24.95	19.95
The Wizard And The Princess	32.95	27.95
Cranston Manor	34.95	29.95
Ulysses And The Golden Fleece	34.95	29.95
Time Zone	99.95	86.95
Sabotage	24.95	21.95
Pegasus II	29.95	25.50
Softporn Adventure	29.95	25.50
Threshold	39.95	29.95
Crossfire	29.95	25.50
Missile Defense	29.95	25.50
Hires Golf	29.95	25.50
Race For Midnight	29.95	25.50
Hires Secrets	125.00	99.95
Pool 1.5	34.95	23.50
Trickshot	39.95	34.95
Shuffleboard	29.95	25.95
Outpost	29.95	26.96
Epoch	34.95	29.95

	RETAIL	MEMBER PRICE
Borg	$29.95	$26.95
Sneakers	29.95	25.50
Gorgon	39.95	33.95
Star Cruiser	24.95	21.95
Cyber Strike	39.95	33.95
Phantoms Five	29.95	25.50
Orbitron	29.95	25.50
Beer Run	34.95	29.95
Wizardry	49.95	39.95
Castle Wolfenstein	29.95	26.95
Best Of Muse	39.95	35.95
Three Mile Island	39.95	35.95
Superscore	34.95	23.95
3-D Drawing Machine	32.95	27.95
Special Effects	39.95	33.95
Micro Painter	34.95	29.95
Olympic Decathlon	29.95	26.95
BUSINESS		
VisicalcTM	200.00	175.00
VisifileTM	250.00	210.00
Desktop Plan IITM	200.00	175.00
VisitermTM	150.00	130.00
VisidexTM	200.00	175.00
Visitrend/VisiplotTM	260.00	225.00
VisiplotTM	180.00	160.00
WordstarTM (C)	349.95	250.00

	RETAIL	MEMBER PRICE
DatastarTM (C)	$295.00	$250.00
SpellstarTM (C)	240.00	190.00
MailmergeTM (C)	135.00	115.00
CalcstarTM (C)	195.00	175.00
TargetTM	195.00	156.00
Property Management System	325.00	245.00
Real Estate Analysis	280.00	210.00
PFSTM	95.00	81.00
Financial PartnerTM	245.00	164.00
Home Money Minder	34.95	31.50
Home Accounting System	74.95	67.50
VersacalcTM	100.00	85.00
Executive Secretary	250.00	225.00
Performance Manager	75.00	65.00
Superscribe IITM	129.95	110.50
Basic Compiler (Microsoft)	395.00	315.00
Magic WandTM (C)	350.00	299.00
MicroproofTM (C)	149.50	128.00
EDUCATION		
Algebra I	39.95	35.95
Arithmetic Skills	49.95	42.50
Fractions	39.95	35.95
Decimals	39.95	33.95
Spelling Bee	29.95	25.50
Statistics	29.95	25.50
Empire I, World Builders	32.95	28.95

TRS-80 SOFTWARE OF THE MONTH FEATURE PRODUCTS FOR FEBRUARY

ENTERTAINMENT	RETAIL	MEMBER PRICE
Adventure 1, 2, 3	$39.95	$26.95
Adventure 4, 5, 6	39.95	26.95
Adventure 7, 8, 9	39.95	26.95
Adventure 10, 11, 12	39.95	26.95
+Eliminator	24.95	21.95
Eliminator (T)	19.95	17.95
Lunar Lander	20.95	17.95
Lunar Lander (T)	14.95	12.95
+Project Omega	24.95	21.95
Project Omega (T)	14.95	12.95
+Starfighter	29.95	24.95
Starfighter (T)	24.95	21.95
Pyramid Of Doom (T)	19.95	17.95
Savage Island I (T)	19.95	16.95
+Master Reversi	29.95	25.95

	RETAIL	MEMBER PRICE
Space Shuttle (T)	$14.95	$12.95
Ball Turret Gunner (T)	9.95	8.95
Danger In Orbit (T)	14.95	12.95
Jet Fighter Pilot (T)	14.95	12.95
+Olympic Decathlon (T/D)	29.95	25.95
Temple Of Asphai (T/D)	39.95	34.95
+Morton's Fork	29.95	24.95
+Interlude	21.95	18.95
BUSINESS		
Maxi-Manager	99.95	67.00
Microproof™ (Mod II)	149.50	128.00
Microproof™	89.50	76.00
+Basic Compiler	195.00	165.00
Electronic Breadboard	49.95	33.50

EDUCATION	RETAIL	MEMBER PRICE
Elementary Math I (T)	$24.95	$20.95
History And Geography (T)	24.95	20.95
Science Package I (T)	24.95	20.95
Junior High Math (T)	24.95	20.95
+French I	19.95	17.95
+German I	19.95	17.95
Reading Comprehension (Inc. 8 Tapes)	79.00	65.00
Great Classics (Inc. 8 Tapes)	79.00	65.00
US History (Inc. 8 Tapes)	79.00	65.00

Key: Assume Both Mod I And Mod III Disk Unless Specified.
+ Mod I only

ATARI SOFTWARE OF THE MONTH FEATURE PRODUCTS FOR FEBRUARY

ENTERTAINMENT	RETAIL	MEMBER PRICE
Adventure 1, 2, 3	$39.95	$26.95
Adventure 4, 5, 6	39.95	26.95
Adventure 7, 8, 9	39.95	26.95
Adventure 10, 11, 12	39.95	26.95
Savage Island I (T)	19.95	16.95
Golden Voyage (T)	19.95	16.95
Galactic Empire (T)	19.95	16.95
Lunar Lander (T)	14.95	13.50
Rescue At Rigel (T/D)	29.95	25.95
Temple Of Asphai (T/D)	39.95	33.95
Pyramid Of Doom (T)	19.95	16.95
Voodoo Castle (T)	19.95	16.95

	RETAIL	MEMBER PRICE
The Wizard And The Princess	$32.95	$27.95
AsteroidsTM (K)	39.95	35.95
Missile CommandTM (K)	39.95	35.95
BUSINESS		
Text Wizard	99.95	89.95
VisicalcTM	200.00	175.00
EDUCATION		
US History (K)	29.95	26.95
US Government (K)	29.95	26.95
Physics (K)	29.95	26.95
Basic Algebra (K)	29.95	26.95

	RETAIL	MEMBER PRICE
Programming I (K)	$19.95	$17.95
Educational System Master (K)	24.95	21.50
General Shop Practices (Inc. 8 Tapes)	79.00	65.00
Auto Mechanics (Inc. 8 Tapes)	79.00	65.00
Digital Electronics (Inc. 8 Tapes)	79.00	65.00
Reading Comprehension (Inc. 8 Tapes)	79.00	65.00
Vocational Vocabulary (Inc. 8 Tapes)	79.00	65.00
Construction (Inc. 8 Tapes)	79.00	65.00

GENERAL BUSINESS SOFTWARE OF THE MONTH FEATURE PRODUCTS FOR FEBRUARY

	RETAIL	MEMBER PRICE
IMS General Ledger	$525.00	$350.00
IMS Accounts Payable	725.00	485.00
IMS Payroll	525.00	350.00
IMS Payroll W/Labor Distribution	725.00	485.00
IMS Balance Forward A/R	650.00	435.00
IMS Open Item A/R	725.00	485.00
IMS Job Accounting	575.00	385.00
IMS Wholesale/Retail Distribution	1900.00	1275.00

	RETAIL	MEMBER PRICE
IMS Mfgr. Inv. Control	$1900.00	$1275.00
IMS Medical/Dental Management	1300.00	870.00
WordstarTM	399.95	330.00
DatastarTM	295.00	235.00
SpellstarTM	240.00	200.00
MailmergeTM	135.00	110.00
CalcstarTM	295.00	235.00
D Base IITM	695.00	555.00

	RETAIL	MEMBER PRICE
TargetTM	$195.00	$155.00
MicroproofTM	149.50	128.00
Magic WandTM	350.00	299.00
SupercalcTM	295.00	250.00
Basic Compiler (Microsoft)	395.00	315.00
FMS-80TM	995.00	795.00

Assume All Require CP/M

Key: All products on disk unless specified
(C) Requires CP/M*
(T) Tape only
(T/D) Tape or disk
(K) Cartridge
*CPM is a trademark of Digital Research

***NOTE:** Buy any number of products from the current list and order two more within the next six months at discounted prices. Members will be informed each month of new products and prices. Guaranteed replacement of defective products for 30 days. Substitutions not permitted. Prices valid to March 15, 1982.

Hundreds of *non-featured* products also available in our free catalog. To join the Software of the Month Club™, simply call toll free 1-800-343-6214, except in MA call 1-617-924-3333, or simply send a check with your order including $2.00 for shipping to:

SoftwareCenters, Inc. Software of the Month Club™ • 25 Elm Street • Watertown, MA 02172
Or simply call toll free 1-800-343-6214.

CIRCLE 72

Computer Information Exchange
Box 159 (714) 757-4849
San Luis Rey CA 92068

Shack-80 Model-1 Users:
Restore Reliability

Tired of spontaneous re-booting, "loss" of memory, UL ERROR on programs that are correct, "BAD RAM" or ROM that is good and other symptoms of dirty edge connectors?

CIE Cramolin cleaning kit lets you quickly, safely strip away coatings of high-resistance oxide films built upon ..S-80's non-gold-plated edge fingers, and coat them to reduce further buildup. Contains one bottle cleaner, one lubricant/sealer.

CIE Cramolin $8.95 ($9.49 CA)

Silver Solder Rejuvinates
Shack-80 Edge Connectors

Ratty Radio Shack edge fingers require frequent Cramolin cleaning for system reliability. Tandy did not gold plate them, but after you silver them you can tug cables and jar computer without system reboot!

Kit contains special high-quality flux and 16" (about 1.5 oz) of solder, 5-6% silver, balance tin (contains no cadmium, zinc, or lead). Caution: do not resolder fingers with ordinary solder, or system will be totally unusable!

CIE $4.50 ($4.77 CA)

Media Buys:
Diskettes

5" Unbranded, single-density, 10, in envelopes, fully guaranteed	$19.95*
5" Memorex sngl dens., box 10	$24.75*
5" Memorex dbl. dens., box 10	$26.55*
5" Dysan, plastic box of 10, double-density ultra-reliable	$44.95*
5" Wabash SSSD with hub ring	$26.55*
5" Wabash DSDD with hub ring	$$38.98*
Reinforcements, 50 rings for 5"	$7.75*
Ring tools--apply reinforcements	$4.95*
Cleaning kits, 3M or FD, 2 disks	$22.46*

GUARANTEE:
All CIE disks guaranteed
If you get a bad disk, CIE will replace it

Hardware:
Percom, LNDoubler Savings

DOUBLE DENSITY attachments $153.50/$157.50/$207*

Double disk storage with either Percom or LNW Research plug-in adapters. No soldering. Percom Doubler 2 comes with DoubleDOS TRSDOS varient, is $153.50*. LNDoubler 1 includes DOS-plus deluxe operating system. LNDoubler 5/8, with operating system, allows use of double density with either 5" or 8" drives!, just $207*

Lowest Prices
On Disk Drives!

TEAC 40-track single/double density, single headed (writes, reads on one side of disk), with incredible 1-yr. factory guarantee! Case, power supply disassembled for shipping, just insert 6 screws. Exclusive: no extender cable needed! $269*.

80-TRACK, 1-HEADED	$395*
80-TRACK, 2-HEADED (dbl sided)	$550*
Bare 40-track, unpowered	$215*
Bare-80-track	$225*

SOFTWARE to 50% off
Leading brands including Acorn, Allen Gelder, Alternate Source, Apparat, Blechman Enterprises, Breeze Computing, CIE, Data Soft, Dorsett, Edu Ware, Ellis Computing, Hexagon Systems, Micro Clinic, Micro Works, Microsoft, Modular Software, Nepenthe, Personal Computer Service, ProSoft, and Ramware.

BOOKS, leading publishers, 10% off

Discounts:
*prices CIE net, including 10% discount for $50 or more total order, 3 or more items nominal shipping charge on all but books and softwre

CIRCLE 67

NEW LITERATURE

Experiments Book

Experiments In Artificial Intelligence for Small Computers presents programs written in Microsoft's Level II BASIC to illustrate artificial intelligence experiments.

The book begins with an explanation of artificial intelligence—its scope and problem areas. A short BASIC program that involves moving a chess king on a small chessboard is used to illustrate the discussion.

Problem solving is covered with emphasis on a program that predicts a human player's choices. The author then focuses on reasoning, primarily by means of a program which stores data and makes deductions from these data.

The book devotes a chapter to natural-language processing or verbal communication. An appendix describes BASIC keywords to help make the book's programs more easily translated to other versions of BASIC.

The price is $8.95.

For more information: Howard W Sams & Co., 4300 W. 62nd St., Indianapolis, IN 46368; (317) 298-5400.

CIRCLE 222

WP Handbook

The Word Processing Handbook is designed for the business manager responsible for the operation of high-technology word-processing systems.

The book is written in a non-technical style to give the reader a better understanding of word processing systems—what they are, what they do, which one to select, as well as the cost of owning and operating a system.

The price of the book is $17.95 clothbound; $8.95 paperback.

For more information: Prentice-Hall, Englewood Cliffs, NJ 07632; (201) 592-2640. **CIRCLE 223**

Data Communications

Covering the TRS-80, Apple II, Heath H-89 and others, *Microcomputer Data Communications Systems* explains personal computers as data-communications terminals and electronic-message systems.

The book details the operation of modems, terminals, electronic bulletin-board systems, communications systems for the deaf and information utilities such as Compuserve and The Source.

The price is $17.95 clothbound; $12.95 paperback.

For more information: Prentice-Hall, Englewood Cliffs, NJ 07632; (201) 592-2640. **CIRCLE 224**

Buying a Computer

Computers for People, a 200-page paperback book, describes the many uses of computers. Topics include home applications, communicating with large computer services, educational applications, and business and professional use. It introduces the reader to new ideas such as electronic mail, word processing and educational simulation.

Computers for People provides seven steps to help readers buy a computer to fit their needs. A 15-page glossary is included to familiarize readers with common computer terms.

The price is $7.95.

For more information: Dilithium Press, 11000 S.W. 11th St., Suite E, Beaverton, OR 97005; (503) 646-2713. **CIRCLE 225**

WE WILL NOT BE UNDERSOLD

CP/M® Software	Software/Manual only
Computer Pathways	
Pearl (level 1)	$ 99/$25
Pearl (level 2)	$299/$40
Pearl (level 3)	$549/$50
Digital Research	
PL/I-80	$459/$35
BT-80	$179/$30
Mac	$ 85/$15
Sid	$ 65/$15
Z-Sid	$ 90/$15
Tex	$ 90/$15
DeSpool	$ 50/$10
Micropro	
WordStar	$319/$60
Customization Notes	$ 89/$na
Mail-Merge	$109/$25
WordStar/Mail-Merge	$419/$85
DataStar	$249/$60
WordMaster	$119/$40
SuperSort I	$199/$40
Spell Star	$175/$40
Microsoft	
Basic-80	$289/$na
Basic Compiler	$329/$na
Fortran-80	$349/$na
Cobol-80	$574/$na
M-Sort	$124/$na
Macro-80	$144/$na
Edit-80	$ 84/$na
MuSimp/MuMath	$224/$na
MuLisp-80	$174/$na
Organic Software	
Milestone	$269/$30
Supersoft	
Diagnostic I	$ 49/$20
Diagnostic II	$ 84/$20
Disk Doctor	$ 84/$20
Forth (8080 or Z80)	$149/$30
Fortran	$219/$30
Fortran w/Ratfor	$289/$35
Other	less 10%
Unicorn	
Mince	$149/$25
Scribble	$149/$25
Both	$249/$50
Data Base	
FMS-80	$649/$45
dBASE II	$595/$50
Access/80	$699/$50
Pascal	
Pascal/MT+	$429/$30
Pascal/M	$189/$20
Miscellaneous	
SpellGuard	$299/$25
The Last One	$549/$na
SuperCalc	$269/$50
CBASIC-2	$ 98/$20
MicroStat	$224/$25
StatPak	$449/$40
Micro B+	$229/$20

Apple Software (Business)

Micropro	
Wordstar	$269
MailMerge	$ 99
Wordstar/MailMerge	$349
SuperSort I	$159
Spellstar	$129
Personal Software	
Visicalc 3.3	$159
CCA Data Mgr	$ 84
Desktop/Plan II	$159
Visiterm	$129
Visidex	$159
Visiplot	$149

Personal Software (cont.)	
Visitrend/Visiplot	$ 229
Zork	$ 34
Miscellaneous	
Micro Courier	$ 219
Super-Text II	$ 127
ASCII Express	$ 59
Apple Software (Entertainment)	
Wizard & Princess	$ 28
Mystery House	$ 24
Flight Simulator	$ 29
Raster Blaster	$ 26
Space Eggs	$ 18
Sargon II	$ 29
ABM	$ 22
Micropainter	$ 29
Apple Panic	$ 28
Pool 1.5	$ 26
Apple Accessories	
Z-80 Softcard	$ 299
Keyboard Enhancer	$ 110
Apple Joystick	$ 49
Sup-r Mod	$ 25
CPS Multifunction Card	$ 199
Videx Board	$ 249
16K Card	$ 159
Sup-r Fan	$ 39
ALF9 Voice Board	$ 149
CCS Cards	$Call
CCS Parallel Model 7720	$Call
CCS Serial Model 7710D	$Call
CCS Centronics Model 7728	$Call

Disk Drives For TRS-80* Model 1

CCI-100 5¼", 40 Track	$ 299
Add-ons for Zenith Z-89	
CCI-189 5¼", 40 Track	$ 389
Z-87 Dual 5¼" system	$ 995
Drives for Z-90	$Call

External card edge and power supply included. 90 day warranty/one year on power supply.

Corvus 5M	**$ 3089**
Corvus 10M	**$ 4489**
Corvus Mirror	**$ 699**
Shugart 8" 801R Raw Drive	$ 399
TANDON 5¼" Raw Drive	$ Call
Power Supplies	$ Call
Diskettes—Box of 10	
Maxell 5¼"	$ 40
Maxell 8"	$ 45
BASF/Verbatim 5¼"	$26.95
BASF/Verbatim 8"	$ 36
Plastic File Box—Holds 50 5¼" dskts.	$ 19
Plastic Library Case 5¼"	$ 3
Plastic Library Case 8"	$ 4
Head Cleaning Diskette	$ 25
Floppy Saver	$10.95
Floppy Saver Rings	$ 6.95
16K RAM Kits	
One Kit	$ 19
Two Kits	$ 37
200ns for TRS-80*, Apple II, (specify): Jumpers	$ 2.50
Computer Systems	
Altos ACS8000 Series	$ Call
Atari 400	$ 359
Atari 800	$ 789
Call for other Atari products	
Zenith Z89, 48K	$ 2149
Zenith Z90, 64K	$ Call
Call for other Zenith products	

For fast delivery, send certified checks, money orders or call to arrange direct bank wire transfers. Personal or company checks require one to three weeks to clear. All prices are **mail order only** and are subject to change without notice. **Call for shipping charges.**

Terminals

Adds Viewpoint	$ Call
Zenith Z-19	$ 719
Televideo 910	$ 519
Televideo 920C	$ 729
Televideo 950	$ 929

S-100 California Computer Systems

Mainframe	$ 349
Z80 CPU	$ 239
64K RAM	$ 569
Floppy Disc Cntrl	$ 339
Integrated Sys. w/int. cables, tstd.	$1975
2P + 2S I/O	$ 269
4 Port Serial I/O	$ 249
4 Port Parallel I/O	$ 179

Casio Calculators

Pocket Comp.	FX702	$199.00
Desk Printr/Calc.	FR100	$ 79.95
Scientific Calc.	FX8100	$ 49.95
Game Watch	CA90 Plastic	$ 49.95
Game Watch	CA901 Steel	$ 69.95
Calendar Watch	AX210	$ 59.95

Printers

NEC Spinwriter	
7710 R.O. Ser	**$2395**
7710 Ser w/tr.	**$2595**
7720 KSR w/tr.	**$2795**
7730 R.O. Par	**$2395**
7730 R.O. Par w/tr.	**$2595**
NEW 3500 Series	**$ Call**
Epson MX-70	**$ Call**
Epson MX-80	**$ Call**
Epson MX-80FT	**$ Call**
Epson MX-100	**$ Call**
PaperTiger 445 Gr. & 2K	**$ Call**
PaperTiger 460 Gr. & 2K	**$ Call**
PaperTiger 560 Gr.	**$ Call**
IDS Prism 80	**$ Call**
IDS Prism 132	**$ Call**
PaperTiger Access.	**$ Call**
Anadex DP-8000	**$ 849**
Anadex DP-9500/01	**$1389**
Okidata Microline 80 Fric. & pin feed	**$ Call**
Okidata Microline 82A Fric. & pin feed	**$ Call**
Okidata Microline 83A 120 cps	**$ Call**
Okidata 84 200 cps	**$ Call**
Centronics 739	**$ 739**
C.Itoh Starwriter I 25 cps, par.	**$1525**
C.Itoh Starwriter I 25 cps, ser.	**$1620**
C.Itoh Starwriter II 45 cps, par.	**$1950**
C.Itoh Starwriter II 45 cps, ser.	**$2075**
Axiom GP-80M	**$ 319**
Data South 180 cps	**$ Call**
Olivetti DY 211 Daisy Wheel	**$ Call**

Monitors

Leedex 12" B&W	$ 129
Leedex 12" Green Screen	$ 139
Leedex 13" Color	$ 329
Sanyo 9" B&W	$ 149
Sanyo 12" Green Screen	$ 238
Sanyo 12" B&W	$ 219
Sanyo 13" Color	$ 399
Zenith 13" Color	$ 349
Zenith 12" Green Screen	$ 129

Telecommunications

Prentice Star Modem 1-yr. guar.	$ 125
Univ. Data System UDS103LP	$ 149
Univ. Data System UDS103JP	$ 215
Novation Cat	$ 139
Novation D-Cat	$ 149
Novation Auto-Cat	$ 199
Novation Apple Cat II	$ 339
D.C. Hayes Smart. Modem	$ 249
D.C. Hayes Micro-Modem II	$ 295
CCI Telnet Com. Package	$ 135

DEALER (NATIONAL/INTERNATIONAL) INQUIRIES INVITED **Send for FREE Catalogue**

The CPU SHOP

TO ORDER CALL TOLL FREE 1-800-343-6522

TWX: 710-348-1796 Massachusetts Residents call 617/242-3361

420-423 Rutherford Ave., Dept. KO2M
Charlestown, Massachusetts 02129
Hours 10AM-6PM (EST) Mon.-Fri. (Sat. till 5)

Technical Information call 617/242-3361
Massachusetts Residents add 5% Sales Tax
Tandy Corporation Trademark/®Digital Research

master charge THE INTERBANK CARD

VISA

CIRCLE 73

ARAB CAPITAL AVAILABLE

We have a list of potential clients from all over the Arab world who have shown interest in promoting, funding, buying and investing in all sorts of real estate projects, or any other worthwhile profit-making venture in North America. We will send you this very select list for $190.

IAAIC
8306 Wilshire Blvd. Suite 198
Beverly Hills, CA 90211

Satisfaction guaranteed or money refunded PC

CIRCLE 74

COMPUTING CONSIDERATIONS

Frustration

continued from page 88

Nevison feels that one interesting thing in learning computing habits—sometimes new to businessmen—is that, "you can't learn by talking about it. There is enough important detail that the only way you will come to terms with it is by putting your body on the line and *doing it.*"

This view echoes that of Dr. Brothers, who states that, "You cannot avoid frustration. It is inevitable in the process of life. What you can do is learn to handle frustration." How does Brothers see handling frustration when faced with a new way of doing things, as in computing? "By simply beginning to learn it. And by not setting unnecessary emotional blocks in your way. Avoid frustration by the very process of starting to learn."

To Nevison, this jumping in is akin to learning to swim. "We can do all the talking we want about strokes, etc. But what's going to come to mind when you jump in is keeping your head above water a regular percentage of the time. That may have gotten lost in the theory. But all of a sudden, in the practice, it comes back. And the integration of it all is a little bit more than the examination of any of the pieces.

"Another good cultural analogue is music. Programming is very much like music, wherein a very few elements give you an extraordinary diversity of accomplishment. How many notes are there when you look at all the songs? Similarly, there are five or 10 elements in a programming language—maybe 20 or 30. It's an oddity of the field actually, that gives you the richness of programming. Nobody would claim from singing a scale that they know how to compose music. You compose music by doing it. You start by making little tunes, then big tunes.

"Now that's programming. Anyone who believes it's like composing music can do it, especially if he apprentices himself to someone who knows something about it. Even if you're the most isolated manager, the best thing you can do is find someone who knows something. He may be a bad "guru," but a bad "guru" is better than none at all. That's at least true for the language that gets you on the system, that lets you edit, that lets you load and unload files. I'd do my damndest to find a warm body who understands."

Tips on temper control

- **In the beginning:** Make sure you know why you're doing what you're about to do. By now you should be firmly convinced of the necessity of using a personal computer in today's world, and of your ability to learn computing. Do a cost/benefit analysis.
- **Find a friend:** Park yourself with someone who knows more than you.
- **On jumping in:** Don't allow yourself to be overwhelmed. Do allow yourself an initial period of inefficiency. Prepare your own personal manual as you go along.
- **On staying in:** Always remember why it is that you're doing what you're doing. Your effort will net you increased efficiency, saved time, more dollars and the knowledge that you are on the leading edge.
- **On expanding your usage:** Always bear in mind that you can be doing other things as well with your personal computer. The uses are as limitless as your imagination.

Tired Of Your GENERAL LEDGER?

VERSA-LEDGER

★ THE ULTIMATE PERSONAL CHECK REGISTER

★ A PROFESSIONAL ACCOUNTING SYSTEM

★ A PERSONAL FINANCIAL MANAGER

★ A SMALL BUSINESS ACCOUNTING SYSTEM

★ A COMPLETE GENERAL LEDGER

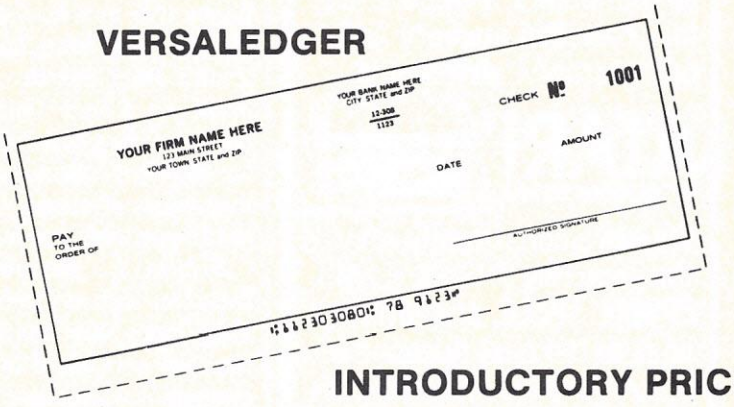
FOR YOUR TRS-80 MODEL I, II , III or COLOR COMPUTER • APPLE II • I.B.M. • XEROX • ATARI
ALL MICROSOFT BASIC COMPUTERS

HOW IT WORKS . . . .

VERSALEDGER is a complete accounting system that grows as you or your business grows. To start, your VERSALEDGER acts as a simple method of keeping track of your checkbook. Just enter your check number, date and to whom the check is made out to. As you or your business grows, you may add more details to your transactions . . . . account number, detailed account explanations, etc.

- VERSALEDGER can give you an instant cash balance at anytime. **(IF YOU WANT IT TO)**
- VERSALEDGER can be used as a small personal checkbook register. **(IF YOU WANT IT TO)**
- VERSALEDGER can be used to run your million dollar corporation. **(IF YOU WANT IT TO)**
- VERSALEDGER prints checks. **(IF YOU WANT IT TO)**
- VERSALEDGER stores all check information forever. **(IF YOU WANT IT TO)**
- VERSALEDGER can handle more than one checkbook. **(IF YOU WANT IT TO)**
- VERSALEDGER can be used to replace a general ledger. **(IF YOU WANT IT TO)**

VERSALEDGER



INTRODUCTORY PRICE
$99.95

- VERSALEDGER HAS AN ALMOST UNLIMITED CAPACITY . . . .
  - (300 checks per month on single density 5¼" disk drives such as the TRS-80 Model-I)
  - (500 checks per month on the Apple II)
  - (2400 checks per month on the TRS-80 Model III)
  - (6000 checks per month on the TRS-80 Model II)
  - (3000 checks per month on single density 8" CP/M)
- VERSALEDGER will soon have an add-on payroll package. **(IF YOU NEED IT)**

— CAN BE USED WITH 1 or MORE DISK DRIVES —

VERSALEDGER HAS BEEN CREATED WITH THE FIRST TIME COMPUTER USER IN MIND

COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

★ ADD $3.00 FOR SHIPPING IN UPS AREAS
★ ADD $4.00 FOR C.O.D. OR NON-UPS AREAS
★ ADD $5.00 TO CANADA AND MEXICO
★ ADD PROPER POSTAGE OUTSIDE U.S., CANADA & MEXICO

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA AMERICAN EXPRESS

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

*** ALL PRICES & SPECIFICATIONS SUBJECT TO CHANGE ***

CIRCLE 33

We will meet or beat *any* price in the U.S.A. on

TRS·80 MICROCOMPUTERS

In fact, **no matter what price** you see advertised by Micro Management, Perry Oil, Pan American, or any authorized Radio Shack dealer for TRS-80 Computers with pure factory installed memory and full warranty, **we'll beat it!**

ATARI® MICROCOMPUTERS

We have consistently offered the complete TRS-80, ATARI, EPSON, APPLE, and MAXELL lines at the best prices in the U.S.A. And we offer the best delivery from the largest inventory in the Northeast.

If you're looking for the best prices in the U.S.A., check the others but call Computer Discount of America.

TRS-80 and Radio Shack are trademarks of Tandy Co.

CALL TOLL FREE: 800-526-5313

Computer Discount of America

COMPUTER DISCOUNT OF AMERICA, INC.
15 Marshall Hill Road, West Milford Mall
West Milford, New Jersey 07480-2198
In New Jersey Call 201-728-8080

CIRCLE 70

SPECIAL REPORT

Mass storage

continued from page 74

stored on the tape are not often accessed. Once the data are dumped, en masse, from the Winchester to the tape, the tape can be safely stored and accessed only as needed. Working files can be kept on the Winchester until completed, and then offloaded onto the tape. This system is effective, but is really only cost-efficient for the larger-systems user; a sophisticated tape-transport mechanism, let alone the cost of the tapes, just runs too high.

For the sake of economy, the industry seems to be settling on the floppy disk as a backup medium for the hard disk. Manufacturers such as Zenith Data Systems, for example, make an 8-inch Winchester with built-in floppy-disk backup that sells for $5595; the Winchester carries 10 megabytes of memory capacity, and the floppy adds one megabyte.

Similarly, peripherals manufacturers such as Lobo provide hard-disk/floppy combinations. The fact that the new breed of 5¼-inch Winchesters is compatible with the standard 5¼-inch floppy drives makes for a happy marriage of the two.

As a buyer, you should also be aware of the need for backup memory in your system, and figure the price accordingly. The trend seems to be toward a bundled approach, with an integral, or at least compatible, hard-disk and floppy configuration. This will make your shopping easier, but you should be prepared to pay a little extra for a memory backup if you're going to go the hard-disk route.

Compatibility concerns

Compatibility problems also need to be addressed concerning Winchester to CPU interface. The typical I/O port of a personal computer moves far too slow for the typical Winchester, where the disk spins at around 3600 revolutions-per-minute. Fortunately, peripherals manufacturers provide the appropriate interface for specific machines, and on the systems manufacturer side, any proprietary disk systems will obviously match the CPU. But if you're attempting to mix and match, be careful about interface requirements. Make sure that the hard disk is compatible with your CPU.

Once you've waded through the mire of technical details and have found what you really need, you can then begin to make an intelligent assessment for a mass-storage-device purchase.

Given that you're looking for mass storage as an after-market purchase—that you've been working with your system already—you're most likely in the cassette camp. If you find that you're happy there, and that you don't need more memory or storage for your programming or applications needs, stay put. There's nothing wrong with using cassettes if you don't need anything larger, and you'll save money, too.

A certain percentage of first-time buyers will opt for floppy disks rather than cassette—and here the choices are a bit harder. The cost to upgrade from cassette to floppy is anywhere from $500 to $1000, but an upgrade from diskette to hard disk can run $3000 to $5000 or more.

What's needed?

The bottom-line question to ask is: How much memory do I need? If you're a free-lance writer who turns out short articles and letters, a floppy-disk system is probably appropriate. If you're the president of an organization, or are running your business with a personal computer, then hard disk may be the only way you can maintain large mailing lists, handle correspondence, cope with ba-

NEW PRINTERS. NEW PERIPHERALS. SAME OLD RELIABLE QUALITY AND VALUE.

1982 will find more OEM's, businesses, dealers and personal computer users turning to MICROTEK than ever before.

TekWriter-1

80 Column Dot Matrix Printer (Formerly BYTEWRITER-1)

The Tekwriter-1 printer is, dollar for dollar, the finest value in the industry. And we've proved it by comparing the Tekwriter-1 to the Epson MX-80. Our print speed is 14 lines per minute faster, our life expectancy is longer, the character sets are the same, and the interface, warranty and printhead replacement cost are all identical.* But the biggest difference is the price. The Tekwriter-1 is about $300 less.

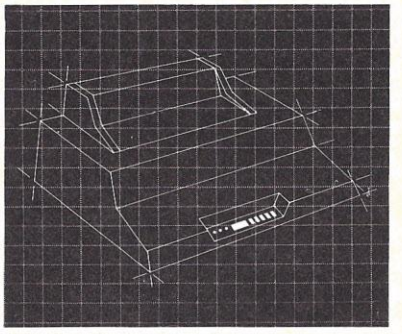
Our extensive testing has proved that the Tekwriter-1 interfaces problem-free to most parallel Centronics and serial (RS-232) computers.

The Tekwriter-1 is tough to beat for performance and quality.

*Data Source: Epson MX-80 Operation Manual

Parallel $349
Serial $389

TekWriter-2



NEW! 80/132 Column Dot Matrix Printer

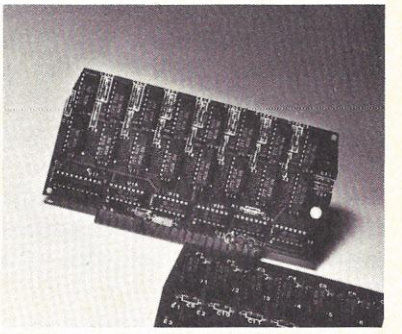
The Tekwriter-2 is perfectly suited to personal, business or OEM applications. Tekwriter-2 is designed to accept single sheet, roll or pin feed paper. It has a 9-wire dot matrix impact print head which produces crisp characters and has underlining capability. The printer is manufactured to run extremely quietly even while operating at peak output levels.

Tekwriter-2 is especially well suited to handle an abundance of text entry because of its data buffer expansion capability to 25K. This ability makes it an efficient graphics generator.

Parallel interface (Centronics type). Interfaces all models of TRS-80, Apple, and Atari 400/800, and most computers with Centronics printer interface.

$695

Peripherals



16K Apple Memory Board

Expands Apple II to 64K RAM Memory. Works with MICROSOFT Z-80 Softcard, Apple PASCAL and Visicalc software.

16K-32K Atari Memory Board

4116 RAM (200NS) Compatible with Atari 400/800

Parallel/Serial Data Buffer Converter

Interfaces with most computers and printers on the market today.
Switch selectable parallel or serial input/parallel or serial output.
Data buffer 2K standard — expandable to 62K.
Serial I/O BAUD rates switch independently selectable.

Atari Parallel or Serial Printer Cables

Pre-tested. Centronics or (RS-232) compatible.

APPLE PARALLEL INTERFACE CARD

Quantity and OEM discounts available.

Continuing our quest for excellence.

TRS-80 is a trademark of Radio Shack, Inc.
Apple II is a trademark of Apple Computer, Inc.
Atari 400/800 are trademarks of Atari, Inc.
Microsoft is a trademark of Microsoft Consumer Products, Inc.
Z-80 is a trademark of Zilog, Inc.
Visicalc is a trademark of Personal Software, Inc.

MICROTEK inc.

CIRCLE 79

MICROTEK
9514 Chesapeake Drive
San Diego, CA 92123
(714) 278-0633
Outside CA call
Toll Free (800) 854-1081
TWX. 910-335-1269

sic accounting functions and perform financial projections. You'll need millions of characters of information to do all that, and only a hard-disk system can get you there.

An added incentive in the area of hard disk is the fact that prices for a typical 5¼-inch hard disk may decline to the point where hard disks become more price-competitive with floppy-disk systems. If and when that happens, the clear choice will be the hard-disk system with its greater memory capacity.

In the interim, all three media—tape, diskettes and hard disks occupy their own niches. But what of the long-term future?

Disk-oriented recording media may not be the ultimate technology. "Bubble memory"—tiny magnetized cylinders contained in a single-crystal sheet—may yet become a viable memory technology. The costs of producing bubble memories, once hailed as the new wave of memory, soared far beyond any reasonable economic expectations, so most of the firms in the bubble race dropped out.

Lately, bubble has been making a bit of a comeback, because the density of bubble memory allows for a considerable amount of storage. The magnetic bubbles can be manipulated by external magnetic fields for the recording and removal of data. The technology can work, given a reduction in cost.

Another potential mass-storage device is the video disk. While current video-disk offerings concentrate on prerecorded formats, recording capability could become a feature of either the video disk or its new relative, the digital audio disk. The fact that the latter is digitized makes it an ideal candidate for the digital format of computers. For the near term, it is more likely that audio and video disks will be used for playback of prerecorded software.

Another potential development in memory is removable hard-disk backup. In the larger systems world, many peripherals vendors offer a combination of fixed and removable hard-disk storage systems; the majority of the memory is in the Winchester enclosure, but several megabytes of memory capacity are contained in the removable tape cartridge. Once the memory has been exhausted in the removable unit, a new one slips into place. This is the same principal used in hard-disk/floppy-disk combination in the current product offerings. But given the trend toward greater memory storage, it is possible that the hard-disk user could well make use of a 5¼-inch Winchester with another hard, but removable, disk.

MANUFACTURING INVENTORY
NOW ON A
MICRO

MICROBOMP
BILL OF MATERIALS EXPLOSION
MATERIALS REQUIREMENT PLANNING
MAXMIN REPORT
STOCK VALUATION
FLAGGED SHORTAGES
ABC ANALYSIS

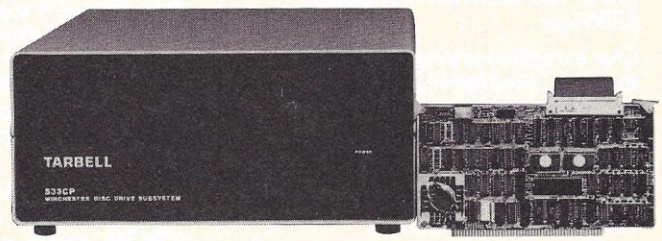
MAXILEDGER
POWERFUL GENERAL LEDGER
PACKAGE WITH DIVISIONAL
REPORTING. CAN BE USED
STAND-ALONE OR INTEGRATED
WITH MICROBOMP

MICROSOFT BASIC UNDER CP/M®
Requires 48k
2 disk drives
ALSO FOR THE APPLE WITH SOFTCARD®

COMPUMAX
P.O. BOX 7239
MENLO PARK, CA 94025
®CP/M IS A TRADEMARK OF DIGITAL RESEARCH

CIRCLE 80

S-100 Computer Owners...
Need more capacity, speed and reliability?



Tarbell 33 megabyte winchester subsystem

CAPACITY ☐ Do you need more disk memory for business applications? Tarbell's hard disk subsystems allow expansion from 10 to over 200 megabytes. And our ATTACH program provides a way to get up-and-running quickly.

SPEED ☐ In most business applications, speed of the disk subsystem is the limiting factor for overall system speed. All Tarbell hard disk subsystems 33 megabytes and above use a voice-coil actuator which provides an average access time of 50 milliseconds. Data comes off the disk into your deblocking buffer at the maximum possible speed of 1 megabyte per second, meaning that a 24 kilobyte file can be loaded into memory in about one second!

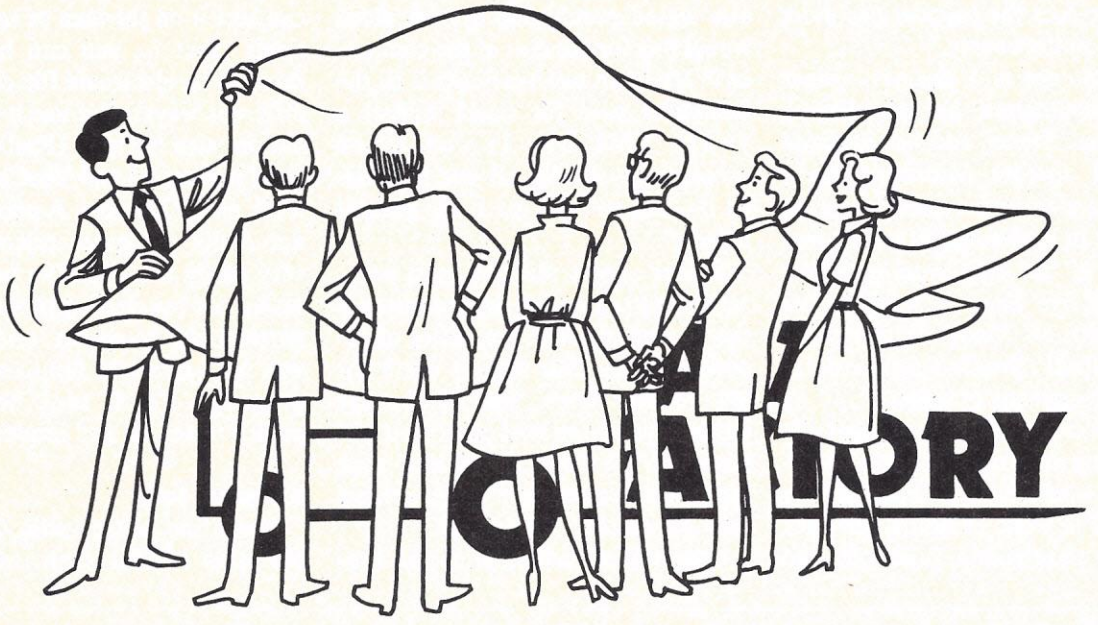
RELIABILITY ☐ Winchester drives have higher inherent reliability because the media and heads are in an air-sealed environment. Other drives are open to contamination from smoke, chemicals and other particles in the air.

Subsystem includes S-100 interface, drive, cabinet, power supply, cables, software and all documentation.

Tarbell Electronics
MANUFACTURER OF COMPUTERS, COMPONENTS AND SOFTWARE
950 DOVLEN PLACE • SUITE B
CARSON, CA 90746 • (213) 538-4251

CIRCLE 81

MAJOR OVERHAUL.



Come in and test drive our new, more powerful 1981 model

Our data base has been out-performing its competition for over two years. This fifth edition offers such quick performance and amazing control that it's difficult to imagine what else you'd want in a data base. The 5.0 version of The Data Factory includes a personal input routine that allows you to completely customize your inputs; a new output routine brings pin point control to your printouts; a new sort feature works with amazing speed (1000 names in under six seconds); multi-data disks on-line; and other new features never before offered on micro computers. Micro Lab leads the way.

With our Extended Warranty for $30 annually, a previous owner may trade-in an earlier version. The 5.0 edition includes the first years Extended Warranty at no additional cost. Call us or see the new Data Factory at your dealer for $300.

© 1981, Micro Lab, Inc.

Apple is a trademark of Apple Computers, Inc.

micro lab

systems that work

2310 Skokie Valley Road
Highland Park, IL 60035 • 312-433-7550

CIRCLE 82

Purchasing power

continued from page 32

going back and punching numbers in the calculator. With VisiCalc, the computer does the calculations more or less simultaneously."

Lucy Stoner is a business owner who computerized her purchasing procedures. Stoner and her husband own and operate Microperipheral Corp., an electronics manufacturing company in Redmond, Wash. Stoner has one of her employees spending less than five hours a week at her firm's TRS-80 Model II computer, running Radio Shacks's Profile database management program.

Stoner estimates that without the purchasing automation they've started, they would have to hire another employee to work 15 hours per week on their purchasing function, and Stoner would have to pay about $12 an hour. That means the semi-automated purchasing system alone would pay for the cost of the computer in less than two years. As it is, the computer paid for itself in half a year. "We use it for word processing—we did all our manuals on it—and we also use it for general ledger."

Stoner agrees that the most natural thing to automate in purchasing is the buying of large quantities of repetitive items. She doesn't use it for low volume items. "But if you are buying any quantity of an item, it will certainly cut your purchasing time and enable you to have better control over purchasing," she states.

Stoner also has high praise for Profile. "We have set up our bills of material and our mailing list on it. You can sort it on thirteen or so different fields (that is, you can have it go through its electronic file cards in 13 different ways). We use it in combination with Scripsit (Radio Shack's word processor) and VisiCalc to keep track of our invoices. A person who is not really computer oriented could very easily use this. The person who set up our purchasing program is not particularly computer oriented and was not extremely familiar with the program. Yet it took her only a month to set up and implement it."

Keeping tabs

Videx Inc. of Corvallis, Ore., went the large MRP-system route, but it

CONTRACT WITH US

CONSTRUCTION ACCOUNTING SYSTEM... CHECK THESE FEATURES:

- ☑ General ledger system
- ☑ Job cost & project management system
- ☑ Payroll with complete reports
- ☑ Bid document processor
- ☑ Subcontractor management system
- ☑ Trial balance report
- ☑ Income statement
- ☑ Balance sheet
- ☑ Workman's compensation reports
- ☑ Easy 1099 preparation
- ☐ **If you want to see the rest of the features contact your local Apple Dealer.**

CMA MICRO COMPUTER DIVISION

CHARLES MANN & ASSOCIATES
55722 Santa Fe Trail
Yucca Valley, CA 92284
(714) 365-9718

CIRCLE 83

MALA

Educational Programs For Your Pet For Only

$48

For 8 Issue Subscriptions

Each "MALA" comes to you on cassette with 4 brand new programs to load and run on your Pet.

• PET • COMMODORE • VIC •

COMM*DATA SYSTEMS, INC.
P.O. BOX 325
MILFORD, MICHIGAN 48042
(313) 685-0113

• PET • COMMODORE • VIC •

GAMES FOR YOUR VIC

VIC TREK • HANGMAN
TANK • YAHTZEE
DAMSEL • NAB PLUS
AND MANY MORE

only $7.95 Each

FREE Program Summaries available

CIRCLE 84

didn't work properly. Matt Bierek, in charge of purchasing for Videx, then set up Personal Software's VisiDex data-base program on an Apple II, into VisiDex and the money into VisiCalc. The programs don't merge. That is, you can't pull data from one and put it into the other without re-

> "We have a rather large computer available to us in the purchasing department, but it isn't economical to put some reports into the large system. That's why I use our 800."

"to sort of keep tabs on what the other system was doing. It was basically just a card system for watching each part, and it lets us know when to reorder." Bierek would log the quantities keying it. "It seems like a lot of work when you first think about it, but it goes very quickly because of the organization of the whole thing," Bierek says.

The main benefit Bierek has seen so far is better control of the quantity of parts on hand. The four to six week backlog of deliveries that has held for the past year is being cut down, and this is giving the staff time to upgrade quality control, packaging and documentation. "Because of this tighter control, this more visual display of the data that is so vital to the operation of the company allows us to see things a little farther in advance. Since we have products on hand all the time, we can maintain that production flow. If you lose a part for one day, you cause a week's worth of slip time at the end of the product line."

The MRP system that Videx originally purchased did not work as well as the Apple II for purchasing. After

PMS

DS 180

HIGH SPEED MATRIX PRINTER

The Datasouth DS180 dot-matrix serial impact printer delivers more features per dollar than any other printer in its class. Here are just a few!

- 180 cps
- 9 x 7 dot-matrix lower case descenders
- Bidirectional/logic seeking
- 132 column width
- Tractor feed (3" x 15")
- X-on/X-off or DTR Synchronization
- Front and Bottom Feed
- Downline loadable setups
- 100% duty cycle
- Parallel and serial interfaces
- Optional features: Compressed font Graphics (dot addressable) APL

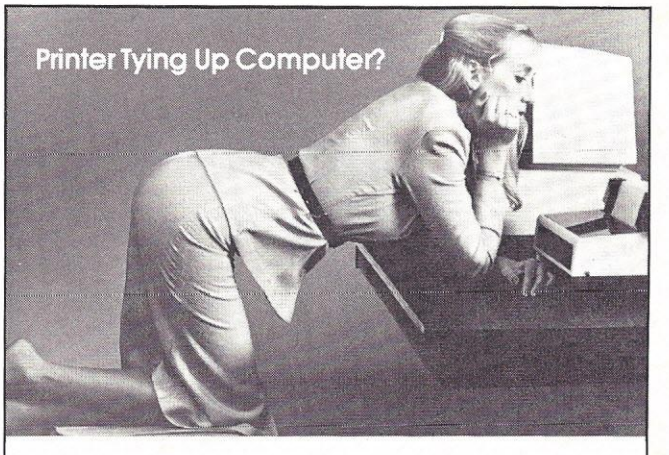
Don't buy any other printer until you've compared the DS180. Call today for free competitive analysis.

California Residents **800-272-3222**

Outside California **800-423-2853**

PMS **PACIFIC MOUNTAIN STATES CORPORATION**
16525 Sherman Way • Bldg. C-4 Van Nuys, CA 91406

CIRCLE 90



CUE is a programmable processor which rapidly accepts from your computer data to be printed and then goes off-line to drive the printer-independent of your computer, which is now free. CUE is better than software spooling since none of your computer's memory, processing power, or disk drives are tied up. CUE is available in parallel, serial, or with both in 2 and 4 port models (connect several printers or computers) with from 16K to 32K memory. Use as an interface.

Prices begin at $299.

MicroCompatible, Inc.
P.O. Box 7624, Atlanta, GA 30357 (404) 874-8366

CIRCLE 89

some careful detective work, Bierek found that the program was buggy. The company scrapped it and sold the hardware. Now they're planning to implement a full MRP system with Apple computers and a Corvus network system linking them to a routing device and a massive main memory.

Currently Bierek has the system semi-automated. He can generate the figures he needs for each aspect of his operation, but he still has to review them manually. When discussing the sizes of companies that would benefit from this kind of system, he says, "Someone with under 300 different parts or 300 separate pieces, and maybe 20 to 30 vendors. It is not so much dollar dependent as it is quality dependent."

One company that went to the expense of fully interactive, integrated custom-developed software was Cromemco, a Mountain View, Calif., computer company. The company believes that purchasing is one of the less standardizable components of automated data processing. Cromemco has tied together modules for inventory, bills of material, production forecasting, production scheduling, work in process control, finished-goods inventory and purchasing. At Cromemco, purchasing is connected to a true MRP system, coupled with manufacturing planning.

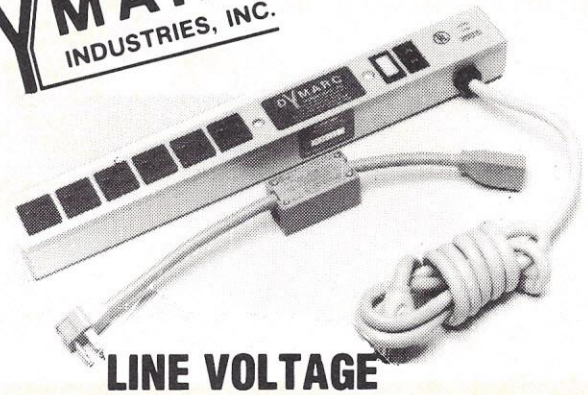
Mike Ramelot, Cromemco's vice president of finance, starts the purchasing process with 12-month and two- to three-month timeframe forecasts. These yield a master schedule. The bill of material comes out of this schedule, and the component purchase requirements come out of the bill of material. The one part of this procedure that isn't automated is the lead times, because there's a judgment factor.

Yield, required dates and amount of inventory on hand are automated. Shortage reporting is needed from the floor so buyers can expedite overrides. This is dangerous for an MRP system, and has to be closely controlled.

Cutting costs

From Ramelot's financial standpoint, the goal of all this is to minimize inventory, because it must be financed, and Cromemco prides itself on minimal reliance on outside financing. You also don't want production to stop at any point. Pur-

DYMARC INDUSTRIES, INC.



LINE VOLTAGE
TRANSIENT SUPPRESSORS
Features Parallel Operation 5000 Hits/Second
Clipstrip™ AND Clipper™

PROTECTS:
- Computers
- Micro-Computer Systems
- Word Processors
- Cash Registers
- Power Supplies

PROTECTS AGAINST:
- High Energy Voltage Transients
- On-Off Switching
- Lightning Induced Transients
- Inrush of On/Off Power

DYMARC INDUSTRIES, INC.
DEALER INQUIRIES INVITED

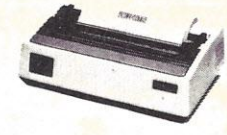
Clipstrip 977E LISTED
Clipper 678F LISTED

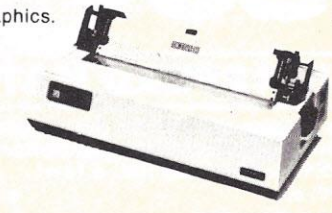
7133 Rutherford Rd. Baltimore, Md. 21207
(301) 298-3130 800-638-9098

CIRCLE 71

Okidata Printers
Make Good Computer Systems
Better!

Okidata quality and reliability have been proven in thousands of computer room installations world wide. Don't settle for less! Okidata Slimline and Microline Series printers cover the full range from 80 CPS to 400 LPM—professional quality printers that produce professional looking copy and graphics.

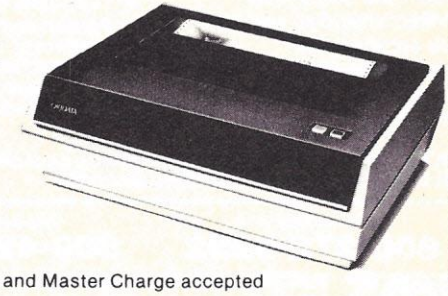




Microline 80	$349.00
Microline 82A	$549.00
Microline 83A	$797.00
Microline 84	$1271.00
Slimline 125	$CALL
Slimline 160	$CALL
NEC 5510 with tractor	$2700.00

robec, inc.
Technology Center
Route 309
Montgomeryville
Pa. 18936

215-628-4960



Visa and Master Charge accepted

CIRCLE 85

chasing agents must maneuver between these two points.

Ramelot's opinion about what size companies can use personal computers is any size. He feels that as a firm outgrows the central processor of its computer, it can go to a mainframe computer with small computers as intelligent terminals, downloading appropriate information for distributed processing. He feels that this is preferable to the traditional data-processing management procedure of batch processing, where the mainframe has a host of nonindependent terminals and the whole process requires waiting time.

Ramelot says that actually low- to medium-volume assembly operations demand more computer power than high-volume ones. The high-volume operations can use batch processing and can wait a day for reports. But when you're trying to move many different assembly operations it gets harder. Cromemco is looking at networking as a possible solution.

According to Ramelot, the three prime factors in the purchasing decision are lead times (manual input), the MRP cycle (seeing when what is needed), and ABC analysis.

Shunned by orthodox MRP devotees as old hat, ABC divides parts purchasing into A parts, valuable parts important to control; C parts, those with a low-unit value; and B parts, those in between. The A parts get the most attention to get fast throughput, so they will form a minimal drain on capital resources. Expensive peripherals like disk drives get "A" categorization from computer companies.

Cromemco's software also helps management assess buyer performance. You can look at buyers' product in inventory, (especially any excess over a four to six month supply) and how many parts have to get expedited. But the buyer with the worst record could be your best buyer, doing a great job with a tough product area.

On the control side, Ramelot looks to the software to marshall things like inventory turns, cost of money, outstanding commitments at any one time and purchase-order variance. The latter looks for price-change trends that could become significant in a two- to three-month timeframe. At Cromemco, purchasing and its attendant computerization are under the manufacturing department.

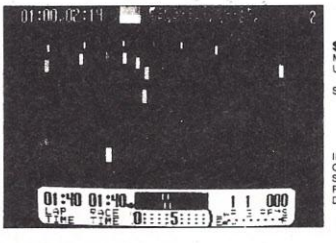
Ramelot agrees with Matt Bierek

Riverbank Software Inc.

PROUDLY INTRODUCES

INTERNATIONAL GRAN PRIX

an arcade-like race car simulation
by RICHARD ORBAN
author of THREE MILE ISLAND*



REQUIRES APPLE II★★ OR APPLE II PLUS★★ 48K, 13 OR 16 SECTOR DISK, PADDLE CONTROL

VISA/MASTERCHARGE MONEY ORDERS/COD DEALER/DISTRIBUTOR INQUIRIES INVITED

$30.00 PER DISK
MD. RESIDENTS ADD 5% U.S. CURRENCY ONLY

See your local dealer

INQUIRIES AND ORDERS: 301-479-1312
SMITH'S LANDING ROAD
POST OFFICE BOX 128
DENTON, MD. 21629

● SPECIAL FEATURES ●

Five GRAND PRIX-style road circuits, including: Oulton Park, Warwick Farm, Karlskoga, and Monaco ● Five speed manual or automatic transmission (with or without cruise control) ● Eight levels of difficulty.

● ADDITIONAL FEATURES ●

Speeds to 198 MPH ● controlled skids ● spinouts ● spectacular crashes ● hair pin turns ● narrow corners ● obstacles ● identified circuit features ● number of laps selection ● flashing last lap indicator ● 'Christmas tree' controlled start ● switch for silent operation ● blue post marks 300' intervals ● best lap/best race times posted ● fully instrumented control panel: lap timer ● race timer ● indicator lights ● edge detectors ● position indicator ● steering indicator ● moving speed tape ● lap counter ● gear and RPM indicators ● operating fuel gauge

RIVERBANK WILL REPLACE DAMAGED DISKS WITHIN 1 YEAR OF PURCHASE. RETURN DISK WITH PROOF OF PURCHASE PLUS FIVE DOLLARS POSTAGE AND HANDLING FOR IMMEDIATE REPLACEMENT (TEN DOLLARS OVERSEAS)

*TRADEMARK MUSE CO., BALT. MD. ★★ APPLE COMPUTER, INC., CUPERTINO, CA

CIRCLE 77

TERMINALS FROM TRANSNET

PURCHASE PLAN • 12-24 MONTH FULL OWNERSHIP PLAN • 36 MONTH LEASE PLAN

	DESCRIPTION	PURCHASE PRICE	PER MONTH 12 MOS.	24 MOS.	36 MOS.
DEC	LA36 DECwriter II	$1,095	$105	$ 58	$ 40
	LA34 DECwriter IV	995	95	53	36
	LA34 DECwriter IV Forms Ctrl.	1,095	105	58	40
	LA120 DECwriter III KSR	2,295	220	122	83
	LA120 DECwriter III RO	2,095	200	112	75
	VT100 CRT DECscope	1,695	162	90	61
	VT101 CRT DECscope	1,195	115	67	43
	VT125 CRT Graphics	3,295	315	185	119
	VT131 CRT DECscope	1,745	167	98	63
	VT132 CRT DECscope	1,995	190	106	72
	VT18XAC Personal Computer Option	2,395	230	128	86
TEXAS INSTRUMENTS	TI745 Portable Terminal	1,595	153	85	58
	TI765 Bubble Memory Terminal	2,595	249	138	93
	TI Insight 10 Terminal	695	67	37	25
	TI785 Portable KSR, 120 CPS	2,395	230	128	86
	TI787 Portable KSR, 120 CPS	2,845	273	152	102
	TI810 RO Printer	1,695	162	90	61
	TI820 KSR Printer	2,195	211	117	80
LEAR SIEGLER	ADM3A CRT Terminal	595	57	34	22
	ADM5 CRT Terminal	645	62	36	24
	ADM32 CRT Terminal	1,165	112	65	42
	ADM42 CRT Terminal	1,995	190	106	72
DATAMEDIA	DT80/1 CRT Terminal	1,695	162	90	61
	DT80/3 CRT Terminal	1,295	125	70	48
	DT80/5L APL 15" CRT	2,295	220	122	83
TELEVIDEO	920 CRT Terminal	895	86	48	32
	950 CRT Terminal	1,075	103	57	39
NEC SPINWRITER	Letter Quality, 7715 RO	2,895	278	154	104
	Letter Quality, 7725 KSR	3,295	316	175	119
GENERAL ELECTRIC	2030 KSR Printer 30 CPS	1,195	115	67	43
	2120 KSR Printer 120 CPS	2,195	211	117	80
HAZELTINE	Executive 80/20	1,345	127	75	49
	Executive 80/30	1,695	162	90	61
EPSON	MX-80 F/T Printer	745	71	42	27
	MX-100 Printer	895	86	48	32

FULL OWNERSHIP AFTER 12 OR 24 MONTHS • 10% PURCHASE OPTION AFTER 36 MONTHS

MICROCOMPUTERS
APPLE • COMMODORE • HP85 • DEC LSI 11

ACCESSORIES AND PERIPHERAL EQUIPMENT
ACOUSTIC COUPLERS • MODEMS • THERMAL PAPER • RIBBONS • INTERFACE MODULES • FLOPPY DISK UNITS

TRANSNET CORPORATION
1945 ROUTE 22 • UNION, N.J. 07083 • (201) 688-7800
TWX 710-985-5485 800-526-4965 OUTSIDE N.J.

CIRCLE 86

of Videx that the relevance of computerized purchasing ties most directly to size and standardization of inventory. But even if your own function lies far from purchasing, the way of combining judgment to machine logic remains similar, and is worthy of study.

Bill Gleaves, purchasing manager at Cromemco, gives a straightforward motto of purchasing: right place, right time, right price, right quanlity. Cromemco doesn't have vendor control automated yet, but Gleaves says this is pretty judgmental—there are not so many factors to juggle. Vendor control will become automated when the next system comes in.

High on Gleaves' current list is purchase-price variance reports, used when the price a buyer authorizes is above or below the standard. Cromemco's cost-savings program mandates a standard price to be reviewed whenever a buyer negotiates a better one. He feels the least automatable function is vendor selection. One may have taken some product back three months ago, and another may have the capacity to fill the order, even if his price is a little higher.

Judgment counts

Chuck Wolf, purchasing manager for the Compushop computer-store chain based in Dallas, Texas, stresses the importance of exercising human judgment. He says that knowing what not to automate is as important as what should be automated. He points out that the machine gives an idealistic result which you have to leaven with personal experience. Correct interpretation of data is critical, and ordering on the basis of historical data alone is a good example of GIGO (Garbage In, Garbage Out).

If this statement seems cautious and discouraging it couldn't be any worse than it was for Bernie Petrocelli when he bought his upscale system and his dealer proceeded to go bankrupt. Petrocelli struggled through the manuals by himself, and had the system up and running in two months.

The positive side of this experience comes from considering the purpose of computerizing purchasing. Ramelot said it one way, Bierek said it another, but both of these businessmen would most likely concur on one fundamental point: If you can indeed marshall, massage and maneuver the data relevant to your task into usable form, you can use the data to anticipate problems, and to control your own business destiny.

SOFTWARE FOR YOUR 16K TRS-80 COLOR MODEL I, III, ATARI 400/800, APPLE II

appletree™ MAGATARI™ TRC™

Do you know all the innovative ways of using BASIC commands? The staff at the Programmer's Institute have spent 8 months designing a set of programs explaining everything the manuals omit. And much more.

The Programmer's Program leads you step by step through the fundamentals of programming your computer. Then you explore the finer points . . . multiple loops, queues, stacks, game programming, sorts, trees, boolean logic, and memory savers. All these methods make your programming tasks easier and more efficient.

Difficult (and very useful) programs are built before your very eyes, and designed so you learn at your own speed! **The Programmer's Program is a must for every owner of a microcomputer** ($40)

On cassette or diskette*, our magazines are designed explicitly for your computer. Included every month are 6-10 ready-to-load programs ranging from games, home entertainment, and personal finance, to more of our unique "teaching" programs. We will also keep you informed of the latest hardware, software, and publications compatible with your microcomputer.

Our January issue will include:
1. FOOTBALL
2. Grand Prix Road Race
3. Home Budget Analysis
4. Geometry with graphics
5. Two more of our special "Teaching" Programs!
6. The latest products and peripherals for your micro.

. . . and as always you get our 100% commitment to excellence and service from the Programmer's Institute.

(Back issues are available!)

Later issues will include backgammon, home budget, forecasting, stock market, and many more. The price per subscription to TRC, APPLETREE, or MAGATARI is $50 per year, $30 per ½ year, and $10 for a trial issue. **Don't miss out on our January issue.**

If you order now, you will receive our complete home accounting system (Reg. 39.95) **ABSOLUTELY FREE** with any $50.00 order. Purchase both above packages and your net cost is only $75.00. This is our New Year's special, so don't wait. **ORDER TODAY!!**

THE PROGRAMMER'S INSTITUTE
A Futurehouse Company
P.O. Box 3191 Dept. D
Chapel Hill, N.C. 27514
(919) 489-2198
MC & Visa Welcome

name _____
address _____
city/st _____

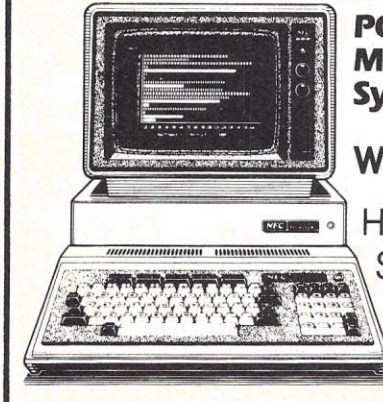
☐ Programmer's Program ☐ Year Subscription ☐ both ☐ Trial Issue
Computer Model _____ ☐ Cassette ☐ Diskette

TRC and the programmer's program are trademarks of Futurehouse.
*All software available on cassette for the TRS-80 Model I, Color Extended Basic, Atari 400/800. On diskette for the Model III, Apple II (Add $5.00 for each diskette order).

CIRCLE 88

Your Computer Should Come from a Multi-Billion Dollar Company with Three Initials

NEC



PC-8000 Series Microcomputer System.

We have It!

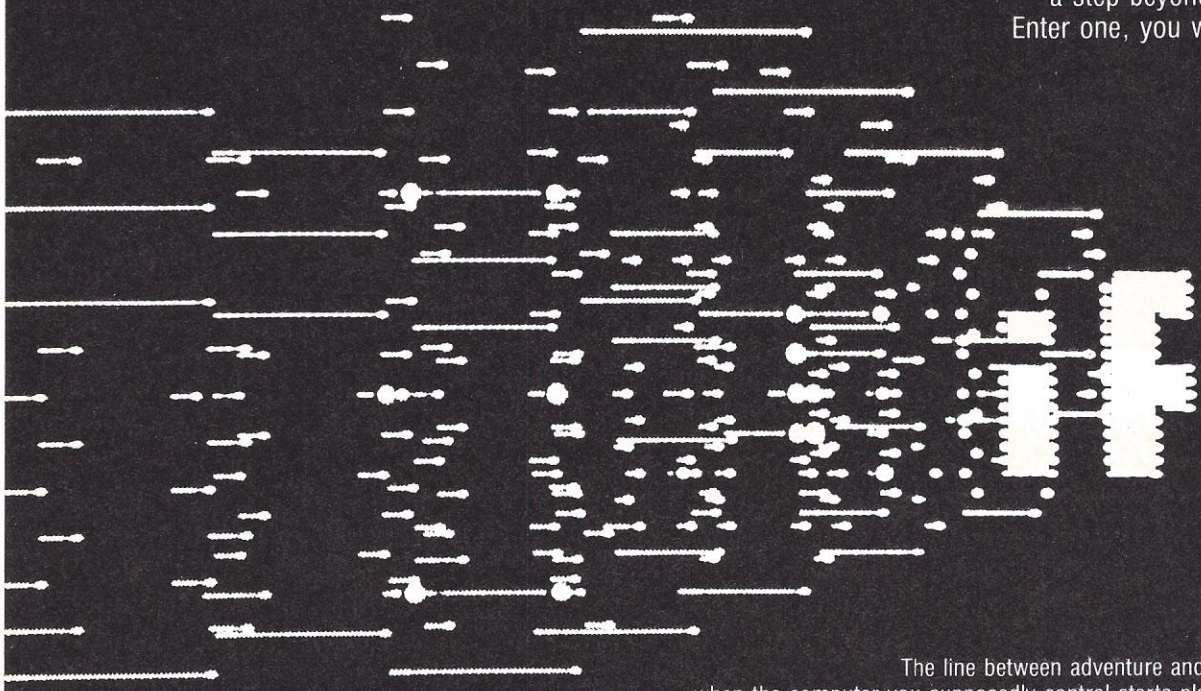
Hardware
Software
A Great Deal

SYNAPSE VIDEO
P.O. Box 962
New York, New York 10009
(212) 860-5776

CIRCLE 87

No Adventure More Challenging
No Challenge More Realistic
No Reality More Frightening

If you're tired of playing juvenile games, **INTERACTIVE FANTASIES (IFs)** are waiting for you.
Each is a classic, an entertainment more sophisticated than most games,
an experience slightly more realistic than you bargained for,
a step beyond the ordinary. . . .
Enter one, you won't want to leave.



the Prisoner

The line between adventure and obsession wears thin when the computer you supposedly control starts playing games with you.

THE PRISONER's challenge is compelling. In a surreal environment where the simplest clue becomes deception and a riddle may suddenly turn a deadly edge, will you keep your wits? In a bizarre world where your captor smiles sweetly at you, will you remain an individual? In a prison where you may never even find the bars, can you escape?

THE PRISONER, a nightmarish gaming fantasy, was written by David Mullich. Available in Applesoft, 48K, DOS 3.2 or 3.3 . . . . . **$29.95**

EMPIRE I: WORLD BUILDERS™

Miner Hobart accumulated several million credits during the years he spent working the asteroid belts and investing wisely in gambling casinos throughout the galaxy . . . but now uranium poisoning is killing him.

Zora has spread her missionary gospel from one village to the next, manipulating the credulous populace with magic charms and rituals . . . yet now she stands facing the deadly point of a unicorn's horn.

Lazeras Long, stricken with cabin fever while in transit to a distant colony, steps out of the air-lock of his craft into the vacuum of space . . . to meet the Lord of Light.

Who are these intrepid pioneers? Citizens of the EMPIRE. Their lives, and the lives of countless others, are yours to experience in **EMPIRE I: WORLD BUILDERS,** where realism goes beyond high-resolution graphics.

EMPIRE I: WORLD BUILDERS™ is the first of a gaming trilogy written by David Mullich. Available in Applesoft, 48K, DOS 3.3 . . . **$32.95**

TERRORIST

Face your opponent. Consider your objectives . . . and his. Examine your options . . . and his. Make your move. You may be too late. Act. Now!

TERRORIST does not skirt the issues — whether nuclear blackmail, a jetliner hijacking, or seizure of the World Trade Center. **TERRORIST** simulates these confrontations more accurately than you may have wanted. Your every move is tangled in bureaucratic red tape, randomness, the ambiguities of international politics . . . and the unpredictable behavior of your opponent. You may choose the role of terrorist or authority. But choose; in **TERRORIST** there is no middle ground.

TERRORIST, a two-player game requiring strategy, steel nerves, quick thinking, game control paddles, and Applesoft, 48K, DOS 3.2 or 3.3 . . . . . **$29.95**

At computer stores everywhere.
Dealer inquiries welcome.

IF™ INTERACTIVE FANTASIES™

Edu-Ware Services, Inc. •
P.O. Box 22222 • Agoura, CA 91301 • (213) 346-6783

CIRCLE 17

BEGIN WITH THE BEST... HAYDEN TEXTS!

BASIC FROM THE GROUND UP (Simon) A BASIC text for high school students and hobbyists that explores computers and the BASIC language without relying on heavy mathematical background on the readers' part. Includes all features of BASIC, as well as some of the inside workings of a computer. Includes exercises and six worked out problems. Glossary and summary of BASIC statements. **#5760-1, $11.75**

BASIC BASIC: An Introduction to Computer Programming in BASIC Language, 2nd Edition (Coan) "...an excellent introduction to the use of BASIC...clearly written and well-organized." Computing Reviews. Over 100 sample programs to present the essential statements of BASIC. Each new language statement or capability is clearly explained at the time that it is first used in a sample program. Practice problems follow every section. Even-numbered solutions appear in the text, the remainder in the Teacher's Guide. **#5106-9, paper, $11.50; #5107-7, cloth, $15.25; #5108-5, Teacher's Guide, $1.40**

BASIC FORTRAN (Coan) Enables you to write meaningful FORTRAN programs for your micro. Over 80 program examples are included. **#5868-9, $9.95**

PROGRAMS FOR BEGINNERS ON THE TRS-80 (Blechman) A valuable book of practical and interesting programs for home use that can be understood and used immediately by the beginner in personal computer programming. Learn step-by-step how 21 sample programs work. Techniques are described line-by-line within the programs, and a unique Matri-Dex™ matrix index will enable you to locate other programs using the same BASIC commands and statements. Each program has a detailed description, complete listing, explanation of what the program does, and instructions for modification. **#5182-4, $8.95**

WEBSTER'S MICROCOMPUTER BUYER'S GUIDE (Webster) A detailed reference guide useful to both first time and experienced users. It provides extensive information on the wide variety of microcomputer systems and suppliers, including new Japanese products. Each microcomputer system description includes a brief overview, central processing systems, peripherals, software, pricing and main office. Business, educational and professional applications of microcomputer systems are detailed. **#5129-8, $25.00**

SPEAKING PASCAL (Bowen) An excellent introduction to programming in the PASCAL language, written in clear, non-mathematical language and requiring no technical background or previous programming experience on the reader's part. Begins with the structure of computers and the problems of programming languages and then goes on to discuss various components of PASCAL. Programs developed using structured programming techniques. Illustrated, exercises, and examples. **#5164-6, $11.95**

ORDER NOW!

Hayden Book Co., Inc.
50 Essex St., Rochelle Park, NJ 07662

Please send me the book(s) checked on 15-day FREE examination. At the end of that time, I will send payment, plus postage and handling, or return the book(s) and owe nothing. On all prepaid, Visa or Master Card orders, publisher pays postage and handling — same return guarantee. Residents of NJ and CA must add sales tax. Payment must accompany orders from PO Box numbers. Name of individual ordering must be filled in. Prices subject to change without notice.

☐ 5106-9	☐ 5760-1	☐ 6164-1	☐ 6175-7
☐ 5107-7	☐ 6154-4	☐ 6165-X	☐ 6176-5
☐ 5108-5	☐ 6155-6	☐ 6166-8	☐ 6184-6
☐ 5129-8	☐ 6156-0	☐ 6174-9	☐ 6185-4
			☐ 6186-2

Name _____

Address _____

City/State/Zip _____

PC 1-82-004

Available at your local computer store!

For Orders, Inquiries and Technical Support Call Toll Free

HAYDEN HOTLINE

800-631-0856

Hayden Book Company, Inc.

50 Essex Street, Rochelle Park, NJ 07662

CIRCLE 106

Cost control

continued from page 24

cash on hand to take advantage of that."

Nye also uses VisiCalc to perform cash-flow analysis, again using forecasted versus actual amounts to find problems in cash flow; and to perform sales levels versus cost analysis, which is a type of break-even analysis that compares costs at different sales levels.

Sales levels versus cost analysis is a kind of "what if" game, and one that shows VisiCalc at its best. By changing the cost of one item, you can determine the sales level necessary to break even.

For example, you have annual sales of $500,000 and your costs of goods sold is $325,000. What happens to your net income if your costs increase to $400,000? What happens to costs if your sales increase to $750,000? Using VisiCalc, you can determine the answers to those questions at the touch of a key.

You can play the "what if" game with VisiCalc in many different areas. Russell uses it to perform tax analysis for his clients.

"We offer financial-planning assistance to our clients to help them organize their businesses and their personal finances," he says,

Russell also prepares 12-month budgets and cash-flow sheets for his clients using VisiCalc. "What used to take three days can now be done almost instantaneously," he says. "We can prepare a new budget for our clients in two or three hours."

Another businessman who uses personal computers for cost control is Chris Aves, president of Petcom Systems. This company performs a personal-computer designing and programming service exclusively for the oil and gas exploration industry.

"We work exclusively for that market because we know the market (His wife, Helena, is president of Helchris Associates, a geological firm) and we feel that the use of computers in the oil and gas industry is different than in the rest of the computer field," he says. "A consulting firm that doesn't know the industry invariably chooses the wrong type of computer system for a company that deals in oil and gas," says Aves, who owns two Apple IIIs and a TRS-80 Model I.

In the oil and gas industry, a large amount of data is necessary to make

Moving?

1. For FASTEST service attach old mailing label in space below

Please allow 6 weeks for change to take effect

If mailing label is not available print your old name and address in this box

2. Print your NEW address here
NAME _____
ADDRESS _____
CITY _____ STATE ___ ZIP ___

3. Mail to: Personal Computing
50 Essex St.
Rochelle Park,
NJ 07662

MICROMAIL

CRT'S • PRINTERS • TELEPRINTERS

★NEW★ C. ITOH 8510 PRINTER $595.00

★SAVE★ TEC 511 CRT $499.00

★LOW★ Letter Quality DIABLO 630 $1950.00

CALL FOR OUR LOW PRICES ON

NEC, QUME, ANADEX, TELEVIDEO, DEC, T.I., TELETYPE, SOROC, C.ITOH

TOLL FREE (800) 854-6028

SAVE ON PREPAID ORDERS

MASTER CARD VISA ACCEPTED

C.O.D REQUIRES 15% DEPOSIT

FOR ORDERING INFORMATION PLEASE CALL

MICROMAIL
P.O. Box 3297
Santa Ana, CA 92703
Phone: 714/731-4338
TWX: 910 595 1146

CIRCLE 91

TRS-80™ DISCOUNT

WE CARRY THE FULL
LINE OF **TRS-80's**

BUY DIRECT
AT WHOLESALE PRICES

MODEL II
26-4002 64K I Drive..... **$3288**
Ask About Hard Drives
MODEL III
26-1062 16K..... **$849**
26-1066 48K with
2 Drives, RS232..... **$2069**
COLOR COMPUTER
26-3001 4K..... **$318**
26-3002 16K Ext. Basic..... **$488**
26-3003 32K Ext. Basic..... **$578**

WRITE FOR FREE CATALOG

1-800-841-0860 Toll Free

TM-TANDY CORPORATION
FREE COPY OF WARRANTY UPON REQUEST

MICRO MANAGEMENT SYSTEMS, INC
DEPT. NO. 9
115C Second Ave. S.W. • Cairo, Ga. 31728
912-377-7120 Ga. Phone No.

CIRCLE 93

INSIDE INFORMATION

More than 25 magazines and journals

The giant 1980-81

Periodical Guide for Computerists

lists two complete years of articles from Byte, Digital Design, Infoworld, Personal Computing, and many more. It's cross-referenced, sturdily bound and easy to use.

Order yours today,
only $11.95
postage paid.

1975-79 annual indexes available, $5 each.

Applegate Computer Enterprises
Box 288P
Applegate, OR 97530

CIRCLE 92

BUSINESS COMPUTING

correct decisions about which wells to drill and which not to drill. "We have a statistical program in which we rank our oil fields," Aves says. "Past production, number of wells, land records, state records and other data are all needed to make a correct decision on which hole to drill. Using a computer and an employee to input the data, a decision can be reached much faster, often in one day instead of in one month."

Using this information as well as revenue to cost ratios, Helchris is able to consult people in the industry. "This is a risk-reward business," says Aves, who serves as a petroleum consultant for Helchris. "If you have as much instantaneously available information through the use of a computer, you minimize your risks," says Helena Aves.

What is this VisiCalc, anyway?

Many articles in this and other publications mention VisiCalc, which may lead people to wonder just what this program is. It's said that VisiCalc has been a best seller since its introduction, but what does it do?

Usually the answer to that question is simply stated: VisiCalc is an electronic spread sheet. What does this mean?

The best way to think of VisiCalc is to think of its mechanical predecessor — ledger paper. VisiCalc puts ledger paper on the monitor screen. Then a user enters whatever he wishes onto the ledger paper through the keyboard. He simply moves the cursor to the position he wants and enters either a fixed value, a label or a formula in that position.

But VisiCalc is much more. Just as word processing is a quantum leap ahead of mechanical typing, an electronic spread sheet is miles ahead of ledger paper. If the user makes a mistake, it's corrected as easily as making a new entry. No erasing is needed. The format is flexible, so if another column of figures must be added, a few keystrokes accomplish the task. Using ledger paper, one might have to start over if his original format didn't work.

This flexible format is only a small part of VisiCalc's power. The real news comes in its ability to answer the question, "what if?" Just what does that mean?

Think of the number of times you have gone through an elaborate plan—one that involved numerical calculations—and worked the structure through to a conclusion. Upon presenting that result to superiors, you found the work destroyed by the simple question, "What if your assumptions aren't valid?"

With VisiCalc, this need be no cause for alarm. Your assumptions are represented by numbers on the electronic spread sheet. To change the assumptions, simply change the numbers. The program automatically calculates the new results that flow from the change. Many people say this ability to "what if" any kind of problem is VisiCalc's greatest advantage.

In addition to VisiCalc, there are other programs of this type available. Anytime a product enjoys the success of Personal Software's hit package it will soon have a number of competitors including:

- SuperCalc, from Sorcim, located in Santa Clara, Calif.
- T/Maker, from Lifeboat Associates, in New York.
- CalcStar, from Micropro, in San Raphael, Calif.
- Microplan, from Chang Laboratories, in Cupertino, Calif.
- Execuplan, from Vector Graphic, in Westlake Village, Calif.

These programs run on different machines, so anyone thinking of purchasing one should ensure that the one he buys will do the job.

Smith-Corona introduces the only daisy wheel printer for under $900.*

You're putting together a desktop computer system for your office or home. And you want to add a letter quality printer so you can do word processing, too. But you don't want to spend a fortune.

Until now, you really had little choice but to settle for dot matrix printers. True, dot matrix doesn't produce letter-perfect printing, but daisy wheel printers just cost too much. That is, they did.

Now, Smith-Corona® offers a daisy wheel printer at such an incredibly low price, you can't afford *not* to get it. (The fact is, you won't find a daisy wheel printer *anywhere* at a price so low.)

The Smith-Corona TP-I™ printer operates with microprocessor controlled daisy wheel technology, and is available with either standard serial or parallel data interface. It is compatible with most microcomputers currently on the market. And, unlike many printers, it's made in America.

Best of all, the TP-I produces results identical to those of our very finest office typewriters—printing with real character. So it can be used to send out letters that have to look perfect. As well as financial statements, inventory reports, direct mail campaigns, manuscripts. Even a letter to your son in college! Anything at all you need printed.

The basic TP-I will handle letter or legal sized paper. An option that will be available soon will enable it to handle either fanfold or single sheet paper.

The TP-I is easy-to-use—just turn the power on, load the paper, and away it goes. There are drop-in ribbon cassettes and a choice of easy-to-change, snap-on daisy print wheels for a variety of fonts.

So stop thinking you can't afford a daisy wheel printer. Because, thanks to Smith-Corona, a printer with real character is no longer expensive. **Smith-Corona**

Please send me more information on the Smith-Corona TP-I daisy wheel printer.

Name_____

Title_____

Company Name_____

Business Address_____

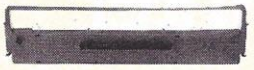
City_____ State_____ Zip_____

Mail Coupon to:
Dwight P. Newcomer, National Sales Manager—Office Products
Smith-Corona
65 Locust Avenue
New Canaan, Connecticut 06840

PERC-2-1

*Manufacturer's suggested retail is under $900, but prices may vary.

Epson® MX 100 & MX70/MX80 Replacement Cartridge Ribbons



Introducing the Epson® MX100 Nylon replacement ribbon cartridge manufactured completely by Aspen Ribbons, Inc., offered in addition to our Epson® MX70/MX80 ribbon. Both of these products are 100% compatible with the original.

Prices are lower than those of the original equipment manufacturer. We encourage all retail, OEM, and wholesale inquiries. Remember, all of our ribbon products are recycleable.

Aspen Ribbons, Inc. • 1700 N. 55th Street
Boulder, Colorado USA 80301-2796
(303)444-4054 • Toll Free 1-800-525-0646
Telex 45-0055

CIRCLE 97

ATTENTION!

February begins a new national monthly publication, CompuKids, specifically designed for computer enthusiasts ages 7-17. Every issue will be packed full of educational computer games, programming hints, motivational articles, cartoons, and advertising.

We can use your help to insure that this badly needed publication is a success. Please forward appropriate articles, original programs, related cartoons and jokes to our Editorial staff (Dept. E) for selection. Interested advertisers and dealers, please contact our Advertising and Marketing Department (Dept. A).

A special 12-month introductory subscription is now being offered at $12, a savings of over $10 of the planned newsstand price of $1.95 per issue.

To subscribe, mail $12 check or money order to:
Barreto and Associates, Incorporated,
Department S
Box 975
Sedalia, MO 65301
or phone (816) 826-0689

For extra prizes, games, contests information throughout the year, and a complementary subscription to CompuKids, join the CompuKids Computer Club. Annual dues are $20. Mail today to Department C of the above address.

CIRCLE 116

Simplified Software Series
M.B. Rowe & Associates

GENERAL BUSINESS PROGRAMS FOR TRS-80

'DOCURITE'—NEW! Includes all of KWIKRITE plus set margins, page length, up to 8 pages in 48 K, many other features. Has same easy formating as KWIKRITE. Mod. 1 or III **$69.50.** DOCURITE without KWIKRITE, Mod. I or III, disk **$39.50.**

Many other programs available. REAL ESTATE PROGRAMS for escrow accounting, closing statements, investment. Don't be deceived by our LOW PRICES! This is quality software with good instruction manuals. FREE comprehensive catalog available upon request!

SIMPLIFIED SOFTWARE SERIES by
M. B. Rowe & Associates
118 Third Ave., N.W., Box 1192
Hickory, N.C. 28601

Include $2.00 postage and handling each program

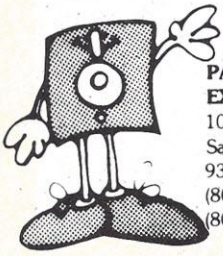
MASTERCARD and VISA accepted
DEALER INQUIRIES INVITED

CIRCLE 118

MEMOREX FLEXIBLE DISCS

WE WILL NOT BE UNDERSOLD!! Call Free **(800)235-4137** for prices and information. Dealer inquiries invited and C.O.D.'s accepted.

VISA



PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. In Cal. call
(800)592-5935 or
(805)543-1037

CIRCLE 119

Educational Software for the ATARI*

Tutorials
Self-Paced Programs
Puzzles
Games
Drill & Practice

Write for Free Flyer

T.H.E.S.I.S.
P.O. Box 147
Garden City, MI 48135
or call
(313) 595-4722 for C.O.D.
Dealer inquiries welcome

*Atari is a trademark of Atari Inc.

CIRCLE 102

for POCKET COMPUTERS

Investing or borrowing? Profit from today's interest rates!

YOU AND YOUR DOLLARS ALL ABOUT INTEREST

Programs for your PC to help you make/save big dollars!

- Easy to use.
- Fully documented.
- Everything you need in one package.

$19., book & cassette: $33. remit in U.S. funds.
Add $3 if outside U.S. California residents add 6% sales tax.

SHARP PC PRODUCTS and GE CASSETTE PLAYER
Write for our Special Offer!

FREE
- Copy of COMPUNOTES, the newsletter for PC users with useful programs, fully explained.
- Directory of products & services.

XCEL
13763 Polk Street, #4C
Sylmar, California 91342
(213) 367-4366

CIRCLE 122

EDUCATIONAL SOFTWARE

For TRS-80, Pet, Apple & Color Computer

ELEMENTARY	MATH
SCIENCE	HISTORY
GEOGRAPHY	ACCOUNTING
ECONOMICS	BUSINESS ED.
FOREIGN LANG.	FARM RECORDS
GRAMMAR	COIN INVENTORY

Write for FREE Catalogue!

MICRO LEARNINGWARE, Box 2134, N. Mankato, MN 56001 (507) 625-2205

VISA & MASTER CARD ACCEPTED

We pay 15% royalty for Educational Programs listed with us.

TRS-80 is a registered Trademark of TANDY CORP. Pet is a trademark of Commodore Bus. Machines. Apple is a trademark of Apple Computer Co.

CIRCLE 99

$ GET YOUR SHARE $

Join the thousands of winners who have built on their computer interest to create a successful data processing-based business, and:

SHARE IN THE MINI/MICROPROCESSING BOOM
Read this exciting new book:

MAKING IT IN DATA PROCESSING – ON YOUR OWN IN THE EIGHTIES

Written by experts in the computer business, this book contains all you need to get started including:

- How to locate manufacturers who will help finance your new venture.
- What types of businesses are available and are best for you.
- Actual sources of Venture Capital looking for new businesses.
- Complete guides to pricing, sales promotion, advertising, publicity, and marketing.
- Dozens of sources of information to help you build your business.

To order, just clip this ad and send with only $19.95 to:

THE SEABIRD PRESS
PO Box 461, Lexington, MA 02173

Full 30 day money back guarantee

CIRCLE 123

NEW! for the '89 from

MAGNOLIA MICROSYSTEMS

DOUBLE DENSITY DISK CONTROLLER

for both 5¼" & 8" drives
only $595 complete
including CP/M™2.2

MAGNOLIA MICROSYSTEMS, INC.
2812 Thorndyke W., Seattle 98199
(206) 285-7266 (800) 426-2841

CP/M is a trademark of Digital Research.

CIRCLE 117

WHAT'S BETTER THAN SPEED READING?

SPEED LEARNING

(SPEED PLUS COMPREHENSION)

Speed Learning is replacing speed reading. It's easy to learn... lasts a lifetime... applies to everything you read... and is the only accredited course with the option of college or continuing education credits.

Do you have too much to read and too little time to read it? Do you mentally pronounce each word as you read? Do you frequently have to go back and re-read words or whole paragraphs you just finished reading? Do you have trouble concentrating? Do you quickly forget most of what you read?

If you answer "yes" to any of these questions — then here at last is the practical help you've been waiting for. Whether you read for business or pleasure, school or college, you will build exceptional skills from this major breakthrough in effective reading, created by Dr. Russell Stauffer at the University of Delaware.

Not just "speed reading" — but speed reading-thinking-understanding-remembering-and-learning

The new *Speed Learning Program* shows you step-by-proven-step how to increase your reading skill and speed, so you understand more, remember more and use more of everything you read. The typical remark made by the 75,000 slow readers who completed the *Speed Learning Program* was: "Why didn't someone teach me this a long time ago?" They were no longer held back by the lack of skills and poor reading habits. They could read almost as fast as they could think.

What makes Speed Learning so successful?

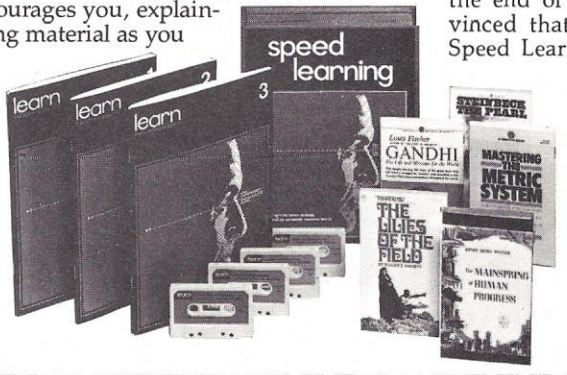
The new *Speed Learning Program* does not offer you a rehash of the usual eye-exercises, timing devices, costly gadgets you've probably heard about in connection with speed reading courses or even tried and found ineffective.

In just a few spare minutes a day of easy reading and exciting listening, you discover an entirely new way to read and think — a radical departure from anything you have ever seen or heard about. Research shows that reading is 95% *thinking* and only 5% eye movement. Yet most of today's speed reading programs spend their time teaching you rapid eye movement (5% of the problem) and ignore the most important part (95%) *thinking*. In brief, *Speed Learning* gives you what speed reading *can't*.

Imagine the new freedom you'll have when you learn how to dash through all types of reading material *at least* twice as fast as you do now, and with greater comprehension. Think of being able to get on top of the avalanche of newspapers, magazines and correspondence you have to read . . . finishing a stimulating book and retaining facts and details more clearly and with greater accuracy than ever before.

Listen-and-learn at your own pace

This is a practical, easy-to-learn program that will work for you — no matter how slow a reader you think you are now. The *Speed Learning Program* is scientifically planned to get you started quickly . . . to help you in spare minutes a day. It brings you a "teacher-on-cassettes" who guides you, instructs, encourages you, explaining material as you read. Interesting items taken from *Time* Magazine, *Business Week*, *Wall Street Journal*, *Family Circle*, *N.Y. Times* and many others, make the program stimulating, easy and fun . . . and so much more effective.



Executives, students, professional people, men and women in all walks of life from 15 to 70 have benefited from this program. Speed Learning is a fully accredited course . . . costing only 1/5 the price of less effective speed reading classroom courses. Now you can examine the same, easy, practical and proven methods at home . . . in spare time . . . without risking a penny.

Examine Speed Learning FREE for 15 days

You will be thrilled at how quickly this program will begin to develop new thinking and reading skills. After listening to just one cassette and reading the preface you will quickly see how you can achieve increases in both the speed at which you read and in the amount you understand and remember.

You must be delighted with what you see or you pay nothing. Examine this remarkable program for 15 days. If, at the end of that time you are not convinced that you would like to master Speed Learning, simply return the program and owe nothing. See the coupon for low price and convenient credit terms.

Note: Many companies and government agencies have tuition assistance plans for employees providing full or partial payment for college credit programs.

In most cases, the entire cost of your Speed Learning Program is Tax Deductible.

COLLEGE CREDITS

You may obtain *2 full semester hour credits* for course completion, wherever you reside. Credits offered through Whittier College (California). Details included in your program.

CONTINUING EDUCATION UNITS

National Management Association, the world's largest association of professional managers, awards 3.0 CEU's for course completion. CEU's can be applied toward the certificate in Management Studies.

PROFESSIONAL SOCIETIES

Speed Learning is offered internationally to members of professional associations such as: American Chemical Society, Foundation for Accounting Education, Institute of Electrical and Electronics Engineers and dozens more. Consult your Education Director for information.

BUSINESS, INDUSTRY, GOVERNMENT

Many companies and government agencies offer Speed Learning as a wholly-paid or tuition reimbursement program. Consult your Training or Personnel Director for details.

PCOM-2

learn INCORPORATED 113 Gaither Drive, Mt. Laurel, NJ 08054

YES! Please rush me the materials checked below:

- ☐ Please send the Speed Learning program @ $99.95 plus $4 postage and handling.
- ☐ Please send the Speed Learning Medical Edition @ $109.95 plus $4 postage and handling.
- ☐ Please send the Junior Speed Learning program (ages 11 to 16) @ $89.95 plus $4 postage and handling.

Check method of payment below: NJ residents add 5% sales tax.

- ☐ Check or money order enclosed (payable to learn incorporated)
- ☐ Charge my credit card under the regular payment terms
  - ☐ Visa ☐ Master Card Interbank No.:_____ ☐ American Express
  - Card No._____ Exp. Date_____

I understand that if after 15 days I am not delighted in every way, that I may return the materials in their original condition for a full refund. No questions asked.

Name _____

Address _____

City_____ State_____ Zip_____

Signature_____

If you don't already own a cassette player, you may order this Deluxe Cassette Recorder for only $49.95. (Includes handling and delivery.)

Check here to order ☐

Outside USA add $10 per item—Airmail extra

PERSONAL COMPUTING DEALERS

Many of the products and services listed in *Personal Computing* are available from the dealers listed here. This listing is in alphabetical order for easy reference.

ALASKA
Computerland (907) 272-1518
Empire Electronic (206) 244-5200
TV Mart Sales and Service (907) 277-2142

ALABAMA
Anderson Computers (205) 539-3444
Computerland (205) 344-4401
Computerland/Mobile (205) 342-2540
Olensky Brothers (205) 344-7448
University Supply Store (205) 348-6168

ARKANSAS
Computerland/Little Rock (501) 224-4508

ARIZONA
Computerland/Phoenix (602) 956-5727
Computerland/Tempel Mesa (602) 962-6732
Computerland/Tucson (602) 297-7023
The Computer Store (602) 866-0258
Dataplace (602) 266-6111
Desert News (602) 747-0428
Food for Thought (602) 327-9481
Heathkit Electric Center (602) 279-6247
Metro Computer Store (602) 323-3116
Micro Age Computer Store (602) 941-8794
Micro Age Computer Store (602) 790-8959
Personal Computer Place (602) 833-8949

CALIFORNIA
Advanced Computer Prods. (408) 946-7010
Advanced Computer Prods. (714) 558-8813
Apple of Orange (714) 974-3082
A-Vidd Electrs. Co. (213) 598-0444
Berkeley Computer (415) 526-5600
Byte Shop (714) 565-8008
Byte Shop (805) 647-8945
Byte Shop No. 1 (415) 969-5464
Byte Shop/Placentia (714) 524-5380
Byte Shop/Sacramento (916) 961-2983
Central Campbell Computers (408) 370-0199
Computer Age (408) 476-6170
Computer Age (714) 565-4042
Computer Center (415) 845-6366
Computer City (714) 549-7749
Computer Components (213) 786-7411
Computer Forum (213) 921-2111
Computerland (213) 371-4624
Computerland (714) 464-5656
Computerland (714) 560-9912
Computerland (805) 928-1919
Computerland (415) 794-9311
Computerland (408) 246-4500
Computerland (408) 267-2182
Computerland (408) 253-8080
Computerland (213) 246-2453
Computerland/El Cerrito (415) 527-8844
Computerland/Los Altos (415) 941-8154
Computerland/Pasadena (213) 449-3205
Computerland/Sacramento (916) 920-8981
Computerland/San Bernandino (714) 886-6838
Computerland/San Fernando (213) 716-7714
Computerland/San Francisco (415) 546-1592
Computerland/Walnut Creek (415) 935-6502
Computerland/W. Los Angeles (714) 560-9912
Computer Merchant (714) 583-3963
Computer Merchant (714) 583-3963
Computer Metrics (714) 579-8066
Computer Place (408) 624-7111
Computer Plaza (805) 687-9391
Computer Plus (805) 963-4542
Computer Plus (408) 735-1199
Computer Post (714) 695-2000
Computer Post (408) 244-5300
Computer Post (415) 790-0410
Computers are Fun (213) 475-5476
Computer Scene (707) 462-1578
Computer Shop (805) 963-1325
Computer Sound (805) 945-5921
Computers To-Go (805) 496-2868
Computer Store (213) 451-0713
Computer Store Chula Vista (714) 281-0285
Computer Store/San Leandro (415) 569-4174
Computer World (714) 891-2584
Consumer Computers (714) 465-8888
CTC-The Computer People (714) 565-0505
Dimentional Software (714) 275-4243
Dow Radio (213) 793-1195
Dow Radio (805) 486-6353
Electric Brain (209) 227-8479
E. T. Research (213) 597-4763
Harding Way News (209) 464-7514
Heathkit Electro Center (213) 749-0261
Heathkit Electro Center (714) 776-9420
Heathkit Electro Center (408) 377-8920
Heathkit Electrs. (415) 236-8870
Henry Radio (213) 820-1234
James Games Computer Center (714) 985-3278
Keplers' Books (415) 948-5666
Leavity Distributors (213) 982-2514
Malibu Micro Computing (213) 456-1137
Marin Computer Center (415) 472-2650
Marvac Electrs. (714) 540-3280
Micro Age Computer Store (415) 786-5264
Micro Age Computer Store (415) 964-7063
Micro Business World (213) 370-4842
Micro Pacific Computer Ctr. (209) 229-0101
Net Profit Computers (714) 750-7318
O Pamp Technical Books (213) 464-4322
Opsbi Personal Electr. (805) 967-7100
P C Computers (415) 527-6657
Peninsula Computer Ctr. (408) 758-9840
Pomona Valley News Agency (714) 591-3885
Poor Richard's Almanac (408) 425-1991
Printers (415) 327-6500
Quement Electrs. (408) 998-5900
Rainbow Computing (213) 349-5560
Santa Rosa Computer Ctr. (707) 528-6480
Software Store (213) 473-1136
Stacey's Bookstore (415) 421-4687
Sunset Computers (415) 665-7378
Systems Formulate (415) 281-2621
Technika Berkeley (415) 524-8934
Wenger Computers (707) 445-9239
Zackit Electrs. (916) 446-3131
Zackit Monterey (408) 375-3144
Zackit Vallejo (707) 644-6676
3 E Software Systems (415) 537-3637

COLORADO
Aparat (303) 741-1778
Colorado Computer Sys. (303) 426-5880
Computer Connection (303) 449-8282
Computer Connection (303) 449-8282
Computerland (303) 574-4170
Computerland/Denver (303) 759-4685
Computer Technology (303) 427-4438
Computer Works (303) 449-6233
Micro Computer Mgmt. (303) 493-5700

CONNECTICUT
AM Computer Prods. (203) 621-2331
Aetna Life Club Store (203) 273-3058
Computer City (203) 521-2245
Computer City (203) 562-7546
Computerland (203) 235-9204
Computerland/New Haven (203) 273-4807
Computer Store (203) 563-9000
Computer Store (203) 356-1920
Computer Store (203) 627-0188
Computer Works (203) 255-9096
Diversified Electrs. (203) 397-2607
Exel Sys. (203) 348-5894
Harold's Drugs (203) 583-1854
Micro Age Computer Ctr. (203) 846-0851
Technology Sys. (203) 748-6856

DELAWARE
Computerland (304) 624-6409
Computerland/New Castle (302) 738-9656
Micro Age Computer Store (302) 998-7340

DISTRICT OF COLUMBIA
Computer Store (202) 272-0294
Pentagon Book Stores (202) 695-0870
Program Store (202) 337-4693
Students Book Co. (202) 223-3327

FLORIDA
A I Personal Computer (305) 339-8914
Byte Shop of Miami (305) 264-2983
Clarks Out of Town News (305) 467-1543
Computer Ctr./Palm Beaches (305) 689-3233
Computerland (305) 862-6202
Computerland (904) 224-9341
Computerland (813) 971-1680
Computerland (904) 731-2471
Computerland/Boca Raton (305) 368-1122
Computerland/Ft. Lauderdale (305) 566-0776
Computerland/W. Palm Beach (305) 684-3338
Computer Scene (305) 945-1014
Computer Shack (904) 396-1800
Computer Store/Gulf Breeze (904) 932-0660
Computer Sys. Resource (904) 376-4276
Data Processing Computer Store (305) 894-8351
Electronic Equipment Co. (305) 871-3500
Goerings Book Ctr. (904) 378-0363
Grice Electrs. Inc. (904) 477-8100
Heathkit Electrs. Ctr. (813) 886-2541
Henry's News Stand (813) 536-3863
H.I.S. Computermation (305) 254-9399
Lighthouse Book Store (305) 781-1945
Micro Computer System Inc. (813) 879-4301
Poling Place (813) 541-2729
West Indies Electr. (305) 556-1300
Williams Radio and TV (904) 354-5460

GEORGIA
Atlanta Computer Mart (404) 455-0647
Baileys Computer Shop (404) 790-5771
Computerland/Atlanta (404) 953-0406
Electronics 21 Inc. (912) 352-0585
Guild News Agency (404) 252-4166

HAWAII
Amtec Inc. (808) 955-7429
Computer Center (808) 448-2171
Computerland/Hawaii (808) 521-8002
Data 1 Microcomputer (808) 946-1733
Radio Shack No. 7086 (808) 487-1509
Univ. of Hawaii Bookstore (808) 948-8022

IOWA
Business Data Processing (515) 276-8858
Memory Bank (319) 386-3330

IDAHO
Computer Co. Inc. (208) 375-9381
Northwest Computer Ctr. (208) 375-6681

ILLINOIS
ABC Byte Shop (312) 673-3550
Alpine Computer Ctr. (815) 229-0200
Book Market (312) 944 3358
Book Market (312) 440-4475
Byte Shop (312) 579-0920
Byte Shop (217) 352-2323
Chicago Main Newstand (312) 864-2727
Compushop (312) 593-1800
Computer-Ease (309) 833-3886
Computerland (312) 949-1300
Computerland (312) 967-1714
Computerland/Champaign (217) 359-0895
Computerland/Northbrook (312) 272-4703
Computerland/Schaumburg (312) 253-3009
Computer Store/Rockford (815) 962-7580
Data Domain/Schaumburg (312) 397-8700
Digitalworld (312) 628-9222
Kroch's & Brentano's (312) 332-7500
Micro Computer Ctr./Geneva (312) 232-1545
Nabih's Inc. (312) 869-6140
Northbrook Computers (312) 480-9190
Oak Brook Computer Ctr. (312) 941-9005
Prairie News Agency (312) 883-1141
The Book Store (312) 255-8040
Univ. Bookstore (618) 536-3321
Videomart Inc. (312) 861-1255
Wallace Micro-Mart Inc. (309) 685-7876
Wine Micro Computers (312) 420-8813

INDIANA
Acro Electronics (219) 397-8681
Computerland (219) 256-5688
Computerland (219) 483-8107
Computerland/Anderson (317) 649-1122
Computer Plus (219) 865-3930
Computer Room (219) 277-1515
Computer Store (317) 662-9994
Data Base (219) 484-3164
Data Domain (812) 334-3607
Graham Electrs. (317) 634-8202
Heathkit Electr. Ctrs. (317) 257-4321
Hoosier Electrs. (812) 232-8508

KANSAS
Amateur Radio Equip. (316) 264-9166
Book Nook (913) no listing
Computerland (913) 492-8882
Computerland Hutchinson (316) 662-6832
Computerland/Topeka (913) 267-6530
High Technology/Wichita (316) 262-0315
Micro Age Computer Store (913) 823-7596
Online Computer Centers (913) 341-6651
Personal Computer Ctr. (913) 649-5942

KENTUCKY
Computer Emporium (502) 589-9482
Computer Place (606) 276-3594
Heathkit Electr. (502) 245-7811

LOUISIANA
Computer Shoppe Inc. (504) 454-6600

MASSACHUSETTS
Computer City (617) 755-5464
Computer City (617) 875-8126
Computer City (617) 273-3146
Computer City (617) 242-3350
Computer City (617) 826-9217
Computer City (617) 774-7118
Computerland/Boston (617) 235-6652
Computerland/Boston (617) 482-6033
Computer Source (413) 443-7181
Computer Store (617) 232-5470
Computer Store (617) 354-4599
Harvest Computer (617) 547-3289
Heathkit (617) 531-9332
Heathkit Electrs. (617) 237-1510
Out of Town News (617) 354-7777
Palace Spa (617) 783-5858
Retail Computer Ctr. (413) 589-0106
Small Computer Data Sys. (413) 592-6600
Small Business Group (617) 692-3800
Video Station (617) 933-1445
YDI Electrs. (617) 449-1005

MAINE
Home Port Computers (207) 873-2192

MARYLAND
Bethesda Computers (301) 657-1992
Chafitz (301) 340-3300
Computer Crossroads (301) 730-5513
Computers Etc. (301) 268-5801
Computers Etc. (301) 268-5801
Computers Etc. (301) 296-0520
Computerland (301) 340-8484
Computerland/Towson (301) 337-5555
Computer Unlimited (301) 321-1553
Heathkit Electrs. (301) 881-5420
Logical Choice (301) 465-3175
Micro Age (301) 762-7585
Muse Computer Ctr. (301) 659-7212
Personalized Computer Consul. (301) 840-0412
Program Store/Baltimore (301) 944-0200
Radio Shack (301) 224-2900
The Comm. Center (301) 792-0600

MICHIGAN
Community News (517) 321-8797

Community News Center	(313) 662-6150
Community Newscenter	(517) 694-0490
Community Newscenter	(517) 349-3510
Computer Center	(313) 422-2570
Computer Connection	(313) 447-4470
Computer Horizons	(313) 464-6502
Computerland/Grand Rapids	(616) 942-9231
Computerland/Southfield	(313) 356-8111
Computer Mart	(313) 288-0040
Computer Mart/Flint	(313) 234-0161
Computer Mart/Lansing	(517) 351-1777
Front Page Bookstore	(313) 332-3431
Heathkit Electr.	(313) 772-0416
Heathkit Electr. Ctr.	(313) 535-6480
Level 4 Products	(313) 525-6200
Metro News 1	(313) 759-0230
Micro Computer World	(616) 451-8348
NCE/Compumart	(617) 491-2700
New Horizons Book Shop	(313) 296-1560
Rainbow Computing	(313) 528-3535
Rochester Book Center	(313) 651-0199
Simtec	(313) 855-3990
Spectrum Computers	(313) 559-5252
MINNESOTA	
ABS Computer	(612) 253-8734
Compudata	(218) 722-6319
Computer Depot	(612) 375-2008
Computerland	(612) 559-1984
Digital Den	(612) 699-8442
Granada News	(218) 727-9122
Heathkit Ctr.	(612) 938-6371
Micro Age Computer Store	(612) 338-1777
Minnesota Book Center	(612) 373-5734
Readmore Bookstore	(612) 333-3628
Readmore Book & Card	(507) 345-5704
Schinders's Hennepin News	(612) 333-6942
Shinder Book & News	(612) 227-0899
MISSOURI	
Computer Country-North	(314) 921-5644
Computer Mart/Springfield	(417) 862-6500
Gateway Electrs	(314) 427-6116
House of Computers	(417) 782-0880
Micro-Age Computer Ctr.	(314) 567-7644
MONTANA	
Prairie Computers	(406) 727-6992
NEBRASKA	
Abacus	(402) 345-6020
Micro Age Computer Store	(402) 564-7213
Computerland/Lincoln	(402) 391-6716
Computerland/Omaha	(402) 391-6716
NEW HAMPSHIRE	
Bitznoytes	(603) 224-8233
Computer City	(603) 898-2390
Computer City	(603) 668-9527
Computerland/Nashua	(603) 889-5238
Computer Mart/New Hampshire	(603) 883-2386
Computer Town	(603) 893-8812
Silent Partner	(201) 947-9400
NEW JERSEY	
Apple Coor	(201) 766-3977
Clancy Paul	(609) 683-0060
Computer Corner/New Jersey	(201) 835-7080
Computer Encounter	(609) 924-8757
Computer Forum	(201) 530-9103
Computerland	(201) 845-9303
Computerland/Cherry Hill	(609) 795-5900
Computerland/Morristown	(201) 539-4077
Computermart/New Jersey	(201) 283-0600
Computer Nook	(201) 575-9468
Computer Universe	(201) 262-0960
Computer Workshop	(609) 429-5703
Comtek	(201) 472-2440
Earth Rise Micro Sys.	(201) 822-0518
Heathkit Electr. Ctr.	(201) 791-6935
Micro Computer Services	(201) 647-3900
Personal Computing	(609) 927-3880
Radio Shack	(201) 244-7494
Radio Shack	(609) 234-2666
Software City	(201) 342-8788
Stoneledge Computer	(201) 277-1020
NEW MEXICO	
Computer Shop	(505) 762-3327
Computer Tech Assoc.	(915) 533-2108
Electronic Parts Co..	(505) 293-6161
Micro Waves Computer Store	(505) 883-0955
NEVADA	
Century 23	(702) 870-1534
Computer Store	(702) 826-5055
Home Computers	(702) 736-6363
PCS Computer Service	(702) 870-4138
NEW YORK	
Adirondak Electrs.	(518) 346-4717
Berliner Computer Ctr.	(516) 775-4700
Castle Computers	(518) 783-9405
Computer Center	(212) 889-8130
Computer Corner	(914) 949-3282
Computer Era	(212) 860-0500
Computers Etc.	(315) 446-6502
Computerland	(212) 840-3223
Computerland/Buffalo	(716) 836-6511
Computerland/Ithaca	(607) 277-4888
Computerland/Massina	(315) 769-9971
Computerland/Nassau County	(516) 742-2262
Computer Microsystems	(516) 627-3640
Computer Room	(518) 869-3818
Computer Shoppe	(516) 758-6558
Computer Store	(212) 832-2180
Computer Store	(914) 428-1661
Computer Store-Rochester	(716) 244-5000
Computer Tree	(607) 748-1223
Comtek/Brooklyn	(212) 332-5933
Comtek/Staten Island	(212) 698-7050
Data Scan Comp. Sys.	(516) 698-6285
Datel Sys.	(212) 921-0110
Future Distribution	(518) 561-5703
Future Visions Computer	(516) 423-7820
Harcourt Brace Bookstore	(212) 888-3333
Harrison Radio	(516) 293-7990
Heathkit	(914) 761-7690
Heathkit Electrs.	(516) 334-8181
Heathkit Electrs.	(716) 835-3090
Home Computer Ctr.	(716) 244-6237
L.I. Computer Store	(516) 887-1500
Magazine Emporium	(212) 864-0500
Majority New Dist.	(212) 243-7770
Micro Age Computer Store	(716) 244-9000
Mr. Computer	(914) 297-1223
Papyrus Books	(212) 864-8862
Programs Unlimited	(516) 997-8668
Programs Unlimited	(914) 761-9283
Spartan Electrs	(516) 499-9500
Super Business Machines	(212) 964-6666
Syosset Video & Electrs.	(516) 921-5454
NORTH CAROLINA	
Book Nook	(919) 725-3696
Byte Shop	(704) 568-8100
Computer Alternatives	(704) 274-5404
Computeroom	(704) 377-9821
K & S Newstand	(919) 724-7537
Liberty News & Beverage	(919) 493-1180
Worldwide News & Specialties	(919) 467-7130
NORTH DAKOTA	
Computerland/Fargo	(701) 237-3069
Computerland/Grand Forks	(701) 746-0491
OHIO	
All Media Material	(216) 678-5499
American Bookstore, New Parma	(216) 888-8210
Basic Computer Shop	(216) 867-0808
Cincinnati Computer Store	(513) 671-6440
Computer Connection	(419) 222-6464
Computer Corner	(216) 473-5010
Computerland/Akron-Canton	(216) 493-7786
Computerland/Cleveland	(216) 461-1200
Computerland/Warren	(216) 544-4191
Cosmic Comics	(216) 784-3449
Hudson Computer	(216) 653-9010
Leo's Book & Wine Shop	(419) 255-5506
Micro Age Computer Store	(614) 868-1550
Micro Center	(614) 486-5381
Micro Computer Ctr.	(513) 435-9355
News Depot	(216) 454-4444
News - Readers	(513) 879-4444
Newstand	(216) 235-9321
Wilkie News	(513) 223-2541
21st Century	(513) 651-2111
OKLAHOMA	
Book Shack	(405) 233-1588
Computerland/Oklahoma	(405) 755-5200
Computerland/Tulsa	(918) 481-0332
Computer Service Unlimited	(405) 329-2154
Computer Store	(918) 224-5347
Employee's Assoc. Bookstore	(405) 686-4295
High Technology Detail	(405) 528-8008
Micro Age Computer	(405) 728-1837
OREGON	
Byte Shop	(503) 644-2686
Computerland/Portland	(503) 620-6170
Computer Solutions	(503) 689-9677
Computer Specialties	(503) 399-0534
Computer Store Corvallis	(503) 754-0811
C 2 E	(503) 245-9785
Fifth Avenue News	(503) 222-7462
Micro Age Computer Store	(503) 256-4713
New Day Computing	(503) 223-8033
Norvac Electrs.	(503) 644-1025
Rich Cigar Store	(503) 228-1700
PENNSYLVANIA	
A & B Computers	(717) 822-7727
Computer Forum	(215) 296-3474
Computer House	(412) 921-1333
Computerland/Dresler	(215) 542-8835
Computerland/Harrisburg	(814) 533-6892
Computerland/Lehigh Valley	(215) 776-0202
Computerland/Paoli	(215) 296-0210
Computer Store	(717) 272-0294
Computer Store	(215) 322-5947
Computer Workshoppe	(412) 823-6722
Drexel University Book Store	(215) 895-2000
Erie Computer Co.	(412) 454-7652
Heathkit Electr. Ctr.	(215) 288-0180
Heathkit Electr. Ctr.	(215) 647-5555
Marketline Sys.	(215) 947-6670
Mighty Byte Computer Ctr.	(215) 443-9020
Pittsburgh Computer Store	(412) 391-8050
20 20 Computers	(215) 439-1800
RHODE ISLAND	
Computer City	(401) 331-2187
Computer Store	(401) 272-8770
Heathkit Electr. Ctr.	(401) 738-5150
SOUTH CAROLINA	
Datamart/S. Carolina	(803) 233-5753
SOUTH DAKOTA	
Computerland	(605) 338-5263
Computerland/Rapid City	(605) 348-5384
TENNESEE	
Chatanooga Computer Ctr.	(615) 892-7038
Computer Lab	(901) 761-4743
Computerland	(615) 246-6173
Computerland/Knoxville	(616) 693-8225
Computerland/Memphis	(901) 767-0233
Eastern Micro Computer	(615) 594-8365
Tobacco Corner	(901) 682-3326
TEXAS	
Agriplex Computers	(806) 797-4495
Axiom Business Computers	(214) 279-1505
Centurion Computers	(817) 778-9105
City Electr. Supply	(713) 621-1060
Compushop	(214) 234-3412
Compushop	(713) 893-2060
Computer Center/Houston	(713) 527-8008
Computercraft	(713) 977-0664
Computerland	(214) 363-2223
Computerland	(512) 724-1551
Computerland/Austin	(512) 452-5701
Computerland/El Paso	(915) 533-6060
Computerland/Houston Bay	(713) 488-8153
Computerland/Tyler	(214) 581-7000
Computerland/Westwood	(713) 270-1200
Computer 'N' Things	(512) 453-5970
Computer Port	(817) 469-1502
Computer Pro	(817) 654-3360
Computer Shop	(512) 828-0553
Computer Solutions	(512) 341-8851
Computer Tech Assoc.	(915) 533-2108
Computer Technique	(713) 947-9633
Computer To-Go	(512) 472-8926
Computer Video Sys.	(214) 423-3654
Expensive Toys/Big Boys	(512) 340-5600
Heathkit	(512) 341-8876
Heathkit Electrs. Ctr.	(214) 826-4053
Lone Star News	(713) 772-9007
Micro Age Computer Store	(602) 894-9247
Micro Age Computer Store	(915) 544-7145
Micro Age Computer Store	(713) 270-9647
Micro Age Computer Store	(713) 440-7547
Micro Computer Shoppe	(512) 855-4516
Northwest Newstand	(713) 681-7310
Percom	(214) 272-3421
Software & Peripherals Ltd.	(817) 566-3888
Waco Comm.	(817) 772-8550
Waghalter Books	(713) 627-9970
Westheimer Newstand	(713) 781-7793
UTAH	
Central Utah Electrs.	(801) 373-7522
VIRGINIA	
Arlington Electric Wholesale	(703) 524-2412
Computerland/Richmond	(804) 741-3536
Computerland/Tysons Corner	(703) 893-0424
Computer Place	(703) 982-3661
Computers Plus	(703) 971-1996
Computer Store	(617) 272-0294
H.B. Computer Ctr.	(703) 295-1975
Heathkit Electrs.	(703) 765-5515
Home Computer Ctr.	(804) 340-1977
Home Computer Ctr.	(703) 595-1955
Program Store	(703) 536-5404
Virginia Micro Sys.	(703) 491-6502
V.P.I. Facilities	(703) 961-5991
WASHINGTON	
A B C Comm.	(206) 364-8300
Alpha Computer Sys.	(509) 586-7603
Amateur Radio Supply Co.	(206) 767-3222
Byte Shop	(206) 622-7196
Central Computers	(206) 746-5227
City News	(206) 455-9683
Computerland	(206) 581-0388
Computer & Video Ctr.	(206) 695-1540
Data-Borne Computers	(206) 248-0101
Empire Electrs.	(206) 244-5200
Heathkit	(206) 682-2172
Heathkit	(206) 246-5357
Personal Computers	(509) 534-3955
Rob Roy Computer Shop	(509) 575-7704
Western Micro Computer Ctr.	(206) 676-9558
WISCONSIN	
American Computer Sys.	(608) 257-1348
Byte Shop/Milwaukee	(414) 281-7004
Century Computer	(608) 788-2350
Chester Electr. Supply	(414) 658-4616
Computerland/Fox River	(414) 233-1808
Computerland/LaCrosse	(608) 781-2090
Computerland/Madison	(608) 273-2020
Computers Unlimited	(414) 355-5206
Computerworld	(414) 733-9547
Four J's	(414) 466-8990
WEST VIRGINIA	
Computerland/Parkersburg	(304) 485-6823
Computer Store	(304) 345-1360
Nicks News	(304) 697-2459
WYOMING	
Computerland/Casper	(307) 234-2879
CANADA	
Computer Circuit ON N6A 342	(510) 672-9370
Computer World BC V6H 1E2	(604) 732-1485
Conte Electrs. BC V5X 3J4	(604) 324-0505
Galatica Computers ABP5JOH1	(403) 424-7007
Micron Dist. ON M5V 131	(416) 361-0609
Minitronics	(604) 872-3225

NEXT IN PERSONAL COMPUTING

Personal computing as a time manager

Personal computing handles receivables

Programming for personal computing

Special report: Word-processing software

PERSONAL COMPUTING

Sales Administrator
Joy Nichols

Sales Coordinator
Anne Lacitignola

Associate Publisher
Jeff Weiner

District Managers
Bill Knickel (408) 736-6667
Robert Pavone (201) 843-0550
Dee Quinn (408) 736-6667
Michael Reynolds (213) 641-6544
Arlene Schulman (201) 843-0550

Japan
Haruki Hirayama (402-4556)

Publisher
Robert J. Lydon

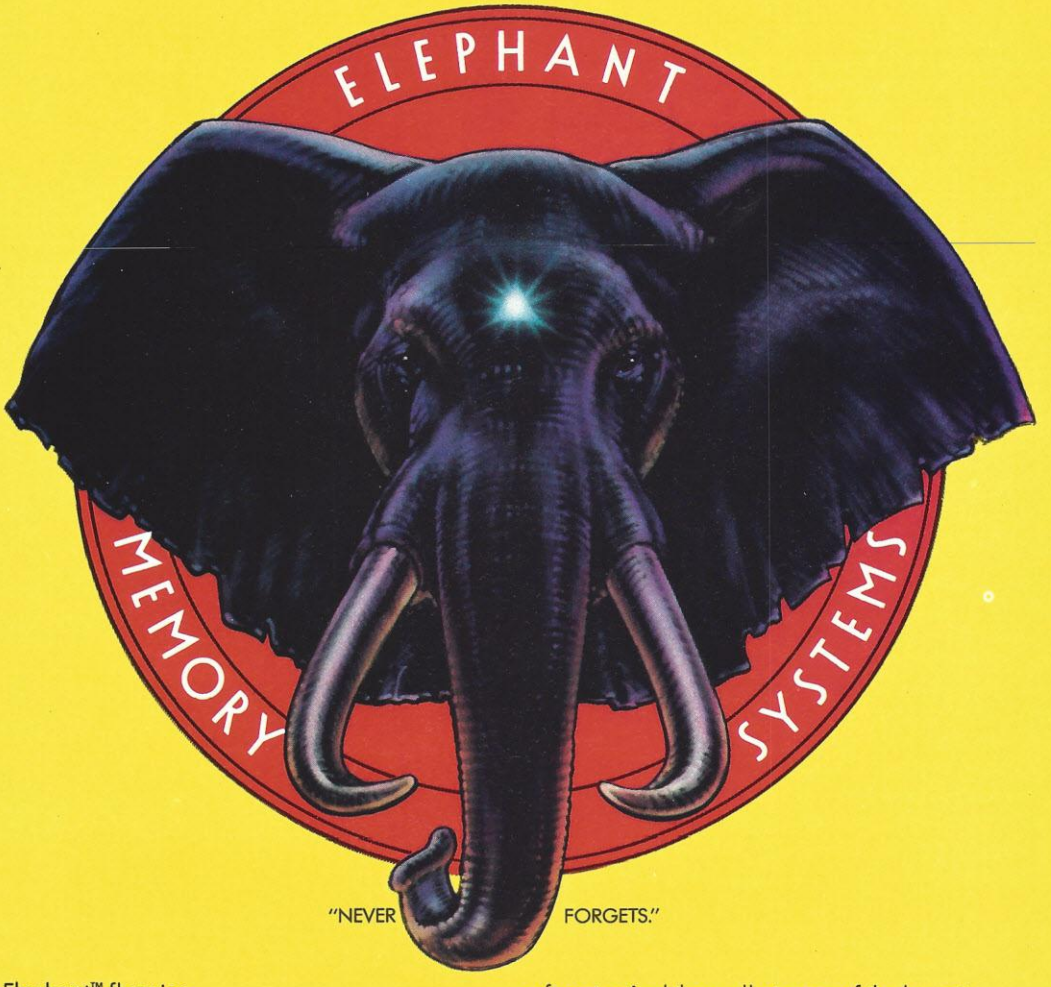
ADVERTISERS INDEX

Many of Personal Computing's advertisers will be happy to send further information about their products and services. Simply circle the bold number that appears to the left of the advertiser's name in the list below. If there is no number listed on the left, kindly write or call the advertiser.

Circle No.		Page No.
32	Aardvark Technical Services	126
18	Addison-Wesley Publishing Co	131
	Advanced Computer Prod	88-8,88-9
78	Anadex	57
92	Applegate Computer Enterprises	154
66	Apple Tree Electronics	134
95	ASAP Computer Products	108,109
97	Aspen Ribbons, Inc.	156
98	Atari	1
116	Barreto Associates, Inc.	156
34,35	Bausch & Lomb/Inst. & Sys. Div	89
68	Beaman Porter	136
	BT Enterprises	88-4
29	Centronics	84
96	Chang Labs	53
83	Charles Mann & Associates	146
38,39	CLOAD Magazine, Inc.	92
84	Comm Data Systems	146
108	Commodore International	C-4
	Communications Electronics	88-6
80	COMPUMAX	144
30	CompuServe	86
70	Computer Discount of America	142
67	Computer Information Exchange	138
25	Computerland	79
54	Computer Mail Order	114,115
33	Computronics	141
44	Consumer Computers	98
11	Corona Data Systems	26,27
8	Corvus Systems	14
73	CPU Shop	139
57	Crystalware	120
45	Cŭesta Systems	121
	Cybernetics	90
24	Dilithium Press	75
14	Dow Jones	44
71	Dymarc Industries	148
	Dynacomp	88-2,88-3
56	Dysan Corp.	117
17,41,42	Edu-Ware Services, Inc.	94,95,151
	Epson America, Inc.	38,39
97	Galactic Software, Ltd.	93
60,106	Hayden Book Co., Inc	135,152
	Hayden Book Co., Inc.	88-11,12,13,14
121	Hayes Microcomputer Products Inc.	72
5	Hewlett-Packard	33
6	Howard Software Services	11
	HW Electronics	88-15
3	IBM	4
31	InnoSys	132
74	Int. American Arab Invest. Corp.	140
	Jade	88-7
27	Jini Micro Systems	85
69	Konan Corporation	96
107	Leading Edge Products, Inc.	C-3
	Learn, Inc.	157
7	Lexisoft, Inc.	13
28,58	Lifeboat Associates	83,123
15	Lobo Drives, International	127
117	Magnolia Microsystems	156
19	Maxell	41

Circle No.		Page No.
118	M.B. Rowe & Associates	156
	Med Systems	88-4
40	Micro-Age Computer Stores	99
94	Micro Applications Group	110
52	Micro Business World, Inc.	112
89	MicroCompatible	147
21	Microcomputer Technology, Inc./MTI	64
72	Micro Con Software Centers, Inc.	137
48,65,82	Micro Lab.	106,130,145
99	Micro Learningware	156
91	Micromail	153
93	Micro Management Systems Inc.	154
63	Micromate Electronics, Inc.	128
46	Microperipheral Corporation	104
9	Microsoft Consumer Products	17
79	Microtek	143
75	MISOSYS	100
61	Morgan Products, Inc.	122
2	Mountain Computers	77
37	Muse Software	91
1	NEC America, Inc.	C-2
26	North Star	42,43
	NRI Schools	105
20	Okidata	63
59	Omega Sales Co.	124
64	Orange Micro, Inc.	129
4	Osborne Computer Corporation	6
119	Pacific Exchanges	156
90	Pacific Mountain States	147
	Palomar	88-5
	Pan American Electronics	88-10
36	Peelings II	102
	Perry Gas & Oil	88-10
	Professional Office Data Mgmt.	88-4
88	Programmer's Institute	150
10	Radio Shack	25
115	RCA Corporation	133
77	Riverbank Software	149
85	Robec, Inc.	148
123	Seabird Press	156
62	Seattle Computer Products	125
76	Select Information Systems	87
113	Sensible Software, Inc.	71
	Sinclair Research, Ltd.	80,81
100	Smith Corona	155
12	Software Publishing Corp.	28
	Spectrum	88-16
49,50	SSM Microcomputer Corp.	101,103
22	Standard & Poor's	69
47	Structured Systems Group	107
87	Synapse Video	150
	Systems Plus.	23
81	Tarbell Electronics	144
51	Target Software	118,119
102	T.H.E.S.I.S.	156
86	TransNet Corporation	149
43	Vector Graphic	9
13	Videx	54
23	Vista Computer	48
55	Western Digital	97
	Westico, Inc.	21
122	Xcel	156

REMEMBER.



Elephant™ floppies.
They're guaranteed to meet or beat every industry standard for quality. They come standard with reinforced hub rings at no extra cost. They come in every popular 5¼"model, in both hard and soft sector. And they sell at some of the lowest prices in the business.
Elephant Flexible Disks.
They're heavy duty. They work for peanuts.
They never forget. Get yourself a trunkful.

HEAVY DUTY DISKS.

Distributed Exclusively by **Leading Edge Products, Inc.**, 225 Turnpike Street, Canton, Massachusetts 02021
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

CIRCLE 107

THE COMMODORE COMPUTERS

"FROM $300 TO $1995, THEY COST LESS AND GIVE YOU MORE FOR YOUR MONEY. READ OUR CHART."

—William Shatner

The idea of a computer in every office and home used to be science fiction. Now it's becoming a reality. The question is, with so many to choose from, which computer should you buy? When you consider the facts, the clear choice is Commodore.

COMPARE OUR $995 COMPUTER

FEATURES	COMMODORE 4016	APPLE II	IBM
Base Price	$995	$1,330	$1,565
12" Green Screen	Standard	299	345
IEEE Interface	Standard	300	NO
TOTAL	$995	$1,929	$1,910
Upper & Lower Case Letters	Standard	NO	Standard
Separate Numeric Key Pad	Standard	NO	Standard
Intelligent Peripherals	Standard	NO	NO
Real Time Clock	Standard	NO	NO
Maximum 5½" Disk Capacity per Drive	500K	143K	160K

Prices are as of the most recent published price lists, September, 1981 and approximate the capabilities of the (16K) PET® 4016. Disk Drives and Printers are not included in prices. Models shown vary in their degree of expandability.

Many experts rate Commodore Computers as the best desk-top computers in their class. They provide more storage power—up to 1,000,000 characters on 5¼" dual disks—than any systems in their price range. Most come with a built-in green display screen. With comparable systems, the screen is an added expense. Our systems are more affordable. One reason: we make our own microprocessors. Many competitors use ours. And the compatibility of peripherals and basic programs lets you easily expand your system as your requirements grow. Which helps explain why Commodore is already the No. 1 desk-top computer in Europe with more than a quarter of a million computers sold worldwide.

WE WROTE THE BOOK ON SOFTWARE.
The Commodore Software Encyclopedia is a comprehensive directory of over 500 programs for business, education, recreation and personal use. Pick up a copy at your local Commodore dealer.

FULL SERVICE, FULL SUPPORT.
Commodore dealers throughout the country offer you prompt local service. In addition, our new national service contract with TRW provides nationwide support. Visit your Commodore dealer today for a hands-on demonstration.

Commodore Computer Systems
681 Moore Road
King of Prussia, PA 19406

Canadian Residents:
Commodore Computer Systems
3370 Pharmacy Avenue
Agincourt, Ontario, Canada, M1W 2K4

CBM-PC

commodore COMPUTER

CIRCLE 108